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## INDEX

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## ENGINEERS AND UNIONS.

The American Association of Engineers is differentiated from other societies of engineers chiefly by the fact that its most significant aim is the increasing of the salaries of engineers. It has already met with some success in this, and is now engaged in a campaign for better salaries for engineers in public employ.

The society has been accused of attempting to "unionize" the engineers of the country, which accusation it has denied emphatically. Unquestionably, five years ago not one per cent of the civil engineers of the country would have considered joining a "trade union"—the idea was considered decidedly non-professional. But the war has revolutionized more things than the map of Europe, and we learn of an old established local engineering society applying for membership in the American Federation of Labor.

The latest startling move in this direction occurred last month, when the scientific and technical employes of the federal government organized as a branch of Local No. 2 of the Union of Federal Employes, affiliated with the American Federation of Labor. (One thing to be borne in mind is that the constitution of the union pledges all its members not to strike nor to support any strike against the government.)

But the coming together of workers at trades and members of scientific professions has not been accomplished by movement of the latter only. The A. F. of L. at its Atlantic City convention adopted resolutions recognizing that "scientific research and the technical application of results of research form a fundamental basis upon which the development of our industries, manufacturing, agriculture, mining and others, must rest"; that "the health and well-being . . . of the whole population are dependent upon advances in medicine and sanitation," and that the advancement of workers of all grades in standards of living is dependent upon scientific research; and finally that "a broad program of scientific and technical research is of major importance to the national welfare and should be fostered in every way by the federal government, and that the activities of the government itself in such research should be adequately and generously supported in order that the work may be greatly strengthened and extended; and the secretary of the federation is instructed to transmit copies of this resolution to the President of the United States, to the president pro tempore of the Senate, and to the speaker of the House of Representatives."

We feel sure that this will prove to be not a joining of professional men with other classes of employes in the wrangling dispute with the capitalists, the common employers of both, which is so generally disapproved of by the great majority of the "middle classes," but something entirely different from this—another important step toward a new era when laborers, trade workers, professional men and "leaders of industry" shall work together for the common good, and capital shall be the common servant of all.

And no set of men can do more to bring this about than engineers. As a class, they enjoy the respect and confidence of both capital and labor. A "Union of Engineers," affiliated with the A. F. of L., but with its own constitution and own methods of working, is a future possibility that may mean much for the rapid and peaceful evolution of the coming social organization in this country.

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# CONSTRUCTING CONCRETE ROAD NEAR NORFOLK

### Up-to-Date Machinery and Methods Employed—Central Mixing Plant and Distribution of Concrete by Trucks—Time Study of Mixing and Distribution—Mechanical Finisher Used—Cost Figures.

By W. A. HARDENBERGH.

Unusual methods and up-to-the-minute machinery are being employed in the construction of a section of concrete road near the army and navy bases, Norfolk, Va., a part of the intricate system of roads connecting the supply bases, storehouses, wharves and piers, the various parts of the camp, and the city. The supervision of the construction is under the direction of the Constructing Quartermaster of the Army, while the Ulen Construction Co. is doing the actual work.

Concrete for the road is mixed at a central mixing plant and is conveyed in motor trucks to the road, where it is dumped directly on the sub-grade and spread by hand to the required thickness and section. Lakewood gasoline-engine-driven finishers are used to tamp and surface the concrete. No expansion joints are being used at present except at the completion of each day's work. In that part of the road first constructed, expansion joints were used at 50-foot intervals. "Elastite" joints were used mainly.

The adoption of the central mixing plant method for the construction of this road was governed by factors other than those that ordinarily would influence a contractor about to begin the construction of five miles of 18-foot concrete road. At the time this method was adopted (last fall) it seemed certain that other roads, located near the site adopted for the central mixing plant, would also be built; owing to local conditions there was scant space for storage piles of aggregate along the right-of-way; it was thought that the problem of handling the aggregate would be much simplified; no special machinery, as paving mixers, would be required; with the addition of extra trucks to carry the concrete, it was thought that work could be handled more flexibly by this method, and in those localities where weather and other conditions were most favorable.

An additional and highly important factor was the fact that trucks were much easier to hire than labor. That is, the trucks and drivers were hired by the hour and laid off at such times as they were not needed or if conditions were unfavorable for work; while labor was hard to get, and if laid off for brief periods, could not again be secured. The use of paving mixers and a gang would necessitate steady employment of the entire force, whether work was being carried on or not. These men were largely replaced by trucks with the central plant plan.

The mixing plant was constructed along the edge of the railroad yard built especially for the use of the supply bases and ample siding space was available. Aggregate cars were unloaded by a clam-shell bucket. Much of this work was done at night, partly to save demurrage and partly because the bucket was also used during the daytime to assist the sand and gravel elevators in furnishing stone and sand to the mixer. Six men were used in a car to guide the bucket and assist in unloading generally. There was small storage space in the mixing shed and the sand and coarse aggregate were piled convenient to the elevators and raised to the bins as used.

A Smith mixer, having a rated capacity of about three-quarters of a yard, was used. This was mounted at such a height that the motor trucks were driven beneath. The concrete was then discharged directly into them from the mixer. Two batches were considered a load for a truck, no matter what its size. Despite some minor faults of design in the matter of handling and routing materials in the mixer shed, the mixer averaged throughout the day about two batches in three minutes and did this regularly, so that there were rarely any trucks waiting in line and but little time was lost by the trucks at the mixer end.

The trucks were hired mainly from local firms at the rate of $2.50 per hour, with 65 cents additional for the drivers. The trucks were paid for only while working, though the contract provided that they be kept in repair by the government, which also furnished gasoline and oil. A repair shop was maintained in connection with the mixer and a chief mechanic was in charge of all work. With very few exceptions, the trucks were all White and Packard, mainly of 3 to 5 tons capacity. The number of trucks hauling concrete varied with the length of haul; some additional trucks were used on grading work.

The length of the road is about 5 miles. The mixing plant was so placed that the longest haul was not in excess of 2¾ miles. It was assumed that for fifty minutes there would be no setting action of the concrete. Allowing for a factor of safety, the work was so scheduled that not more than thirty-five minutes was supposed to elapse between the time of mixing and the dumping of the concrete on the subgrade. This schedule was pretty rigidly adhere to; except on the longest hauls, the time ordinarily consumed was considerably less than this.

The greatest loss of time occurred in getting the truck into position to dump. The road under construction was on one side of an electric railway (double track), while the road over which the material was being hauled was on the other side. Crossovers were placed as near together as possible, but it was frequently necessary to back the trucks for as much as three hundred feet, at times even more. Coupled with a few soft spots in the subgrade, where the heavily loaded trucks would be still further delayed, this part of the work was hardest to keep on exact schedule. Generally speaking, the schedule of the trucks was about as follows, assuming a one-mile haul: Loading, including turning at the loading station, starting, etc., 5 minutes; driving to place of dumping (this was through very heavy traffic and over a viaduct with a long and rather stiff grade), 10 to 12 minutes; backing into position, dumping and unloading, 8 to 10 minutes; return trip 10 to 12 minutes. This gave a total time for the round trip of about 40 minutes, with an average number of trips per 8-hour day of about 12. On the 2¾-mile haul, 6 to 8 trips were made daily. On the whole, it was found that 15 to 20 minutes were consumed in loading and unloading, while a rate of 6 to 10 miles an hour was maintained between the mixer and the road. An excellent road (bituminous macadam) was available for the entire haul and this fact greatly aided the work.

The bodies used for hauling the wet concrete were not unusual. Especial tightness did not appear to be necessary, nor was there any leakage noticeable. The aggregate settled to the bottom and the more liquid material rose to the top. Where the rear end board of the body did not fit tightly, a piece of burlap laid along the crack prevented leakage. Every truck was equipped with a power dump with one or two exceptions and these had a balanced hand-dump arrangement that was almost as good, though a little slower. A very dry mix was used compared with that usually employed with a paving mixer on concrete road construction. There was, as stated above, considerable separation of the ingredients, but this did not appear to cause any bad results. With a longer haul or a rougher road or both, there might have been some evil effects. Also, since the aggregate would have been packed much more tightly, the removal might have been a matter of considerable moment, especially in regard to the laborers required and the time lost by the truck while the mass was being removed.

Three men were usually employed in scraping out the trucks, etc. After the truck was unloaded, these men and two others raked and hoed the concrete into place, spread it to the required thickness and brought it roughly to the required shape and grade. Tamping and finishing were done by means of a Lakewood finisher. This device is driven by a small gasoline engine and has three distinct operations. First comes the template, which brings the surface to the proper section and contour. Following this is a wooden bar, also cut to the proper cross-section, which moves violently up and down, tamping and compacting the concrete. In the rear of this is a canvas belt about a foot wide, which is moved back and forth across the road to give it a finished surface. No brooming was done, but some trowel finishing work was necessary here and there. After 24 hours, the road was covered with earth to protect it while curing.

Owing mainly to the fact that wooden side forms, warped and worn, were used, two men were required to operate the finisher. In the condition in which they were being used, the forms furnished a very poor trackway for the finisher, which had to be guided lest it run off. Another man assisted with the finisher and did the trowel work when necessary.

Work was carried on at two places. This was necessary because of the fact that the number of trucks that could operate in one place was limited. A finisher was used at each place. The daily total of work amounted to from 450 to 600 feet per day of completed road. No attempt was made to increase the amount of work by fostering a spirit of rivalry between the two gangs.

The road is 18 feet wide, 7½ inches thick in the center and 5 inches at the edge. The concrete is mixed 1:1½:3, Edison portland cement being used mainly. No reinforcement is used except at expansion joints, where round iron bars are placed at 1-foot intervals to prevent buckling. Expansion joints are now placed only at the end of each day's work.

Not a great deal of grading is necessary. Most of this work is light and is best done by hand. Over the greater part of its length, the new road follows an old and little used highway, while the country is generally very flat and there are no hills. The main problem in grading was encounterd where the right-of-way crosses a very soft marshy area. A small amount of fill was available from nearby sources and this was moved with No. 3 Standard Supply and Engineering Company 2-wheel dump scrapers, each drawn by a pair of mules, with a snatch team for loading. The remainder of the fill is being hauled some three miles by motor truck. Loading is done by a steam shovel and the round trip of three miles, dumping, return and loading, is made regularly in one hour. Like the other trucks, these are White and Packard and are hired under the same conditions as the others. Three yards is considered a load.

Materials such as broken stone, sand and cement, are being furnished from the supply base. Omitting the cost of these materials from consideration, the construction cost of the pavement has been in the neighborhood of $30,000 per miles of completed road. Per square yard the price has run from about $3.20 down to the present mark of $2.80 and there is a likelihood of a still further reduction before the work is completed. The work was started last fall, but was suspended before much progress had been made. Started again this spring under the present management, progress has been much more satis-

TRACTORS DRAWING SWEEPING MACHINES IN ALBANY, N. Y.

factory. Labor has been hard to get owing to the great demand for it at nearby camps and on neighboring construction. The rate paid is 46 cents an hour. About 175 men are now at work on this particular job.

Throughout, the work shows careful planning and good management. Operating under the conditions under which this road is being built, there are numberless chances for costs to rise. Succeeding to a plant not constructed according to their own ideas and, in some details, not wholly fitted for the work, the men in charge have handled the job admirably and the steadily decreasing costs under their management may be an augury that this method of constructiton may become, if not a standard, at least more popular than it is now.

## MOTORIZATION OF SWEEPING MACHINES.

By WILLIAM J. COFFIN.*

The Street Department of Albany, N. Y., is now using tractors for hauling the sweeping machines. The tractor is a Ford unit with the Union Truck attachment. The sweeping machine is the ordinary type of horse-drawn sweeper from which the front truck is removed, the sweeper being connected to the tractor by a rocking fifth wheel. The arrangement is shown quite clearly in the accompanying photograph. It will be noted that the sprinkler tank is mounted on the tractor. This is done in order to get the water on the pavement a considerable distance ahead of the broom to properly moisten the dirt. The distributor pipe of the sprinkling system is located close behind the front wheels of the tractor.

The tractor speed is about one-third that of the ordinary Ford car for a given engine speed. This makes it possible to operate entirely on direct drive, excepting on a few very steep grades, and insures an evenly running machine at low speed.

It is found that the tractor sweepers operate successfully at about double the speed of the machines when horse-drawn, but it is necessary to gear down the rotary broom drive so that the broom will revolve at about the same rate as when the machine is horse-drawn. While the speed when sweeping is doubled, the speed over the route figured on total time is about one-third greater than that of the horse-drawn machine, as the tractors must stop to fill the sprinkler tanks while the horse-drawn machines are preceded by a sprinkler wagon. Three tractor sweepers will take the place of four horse-drawn sweepers and the horse-drawn sprinklers.

## WATER METERS IN MILWAUKEE.

On January 1, 1919, the Milwaukee water department had in service 65,072 water meters, of which, 55,586 were ⅝-inch, 6,939 were ¾-inch, and 57 were larger than 4-inch. During the year 1918, 14,824 meters, or 22.7 per cent of those in service, were repaired, the repairs on 10,595 consisting of minor adjustments for accuracy of registration or for the removal of accumulated sediment, which repairs are chargeable to the Division of Meters and Services. The remaining 4,229 required new parts and the repairs were charged to the owner or consumer. Of the former repairs, 5,328 were made on the premises.

Annual tests on the premises of meters ranging in size from 3-inch to 12-inch have been carried on by the division for seven years, with a view to maintaining accuracy of registration. Last year 266 such meters were tested, and the average under-registration found was 2.86 per cent.

The total cost of operation of the division for the year was $52,675.41, and $23,026.77 was received for repairs and sales. The average cost per meter (all sizes up to 12-inch) for repairs, both material and labor, was $2.14, or 48 cents per meter based on all meters in service. The cost of operation and repairs—all expenses of the division—per meter in service was 80 cents, or 45 cents if the revenue received be deducted.

## REFUSE COLLECTION IN ROCHESTER*.

### Horse-Drawn vs. Motor Vehicles — Work Methods Employed and Suggested Changes—Frequency of Collection—Amounts of Refuse.

Comparing motor trucks with horse-drawn wagons for refuse collection, the report says "Enthusiasts advocate this method of hauling as a panacea for all the troubles of collection. As a matter of fact, however, the solution of the hauling problem cannot be reached so easily. Motor equipment might prove more economical than team hauling in one city and more costly in another. It is a question of comparative costs which must be determined for each locality.

"The largest factor in determining whether motor trucks will prove economical is the relative time spent in loading and in hauling. Unless hauls are extremely long, the loading time in collection is bound to be extremely high. Where the refuse can be delivered to a central unloading station and from there hauled to the point of disposal, without doubt there is advantage in the use of motor vehicles for the second part of the operation. But the practicability and economy of central loading stations depend largely upon local conditions as to length of haul, and it is believed that relay stations are not necessary and would not prove satisfactory in Rochester. This is true because the average length of haul is about one mile and a half. Furthermore, where loading stations have been used, the public has registered such serious objections that in a few instances at least they have been abandoned."

In an appendix to the report are given a number of figures as to costs of horse-drawn and motor truck collection wagons which we will refer to later. It is estimated that for Rochester the cost per day of a 3½-ton truck would be $12.69, that such a truck would collect 36 cubic yards a day on the average, making the cost per cubic yard 35.3 cents; while a horse-drawn wagon would collect 20 cubic yards a day, making the cost 30 cents with hired teams or 28.3 cents with city-owned teams.

Under other conditions and for certain of the work in Rochester, however, it is believed that motor trucks would be economical. For instance, two trucks have been purchased for use in pick-up work and it is believed that these will prove economical for collecting ashes from places where they accumulate in large quantities because of the short relative time required for loading. It is recommended that a 1½-ton truck be purchased for pick-up work in garbage collection, this truck to be sent out in answer to complaints of non-collection and to collect small dead animals. Also it is believed that a 2½-ton truck equipped with a 3½-yard body could be used to advantage for collecting garbage in the Charlotte district, where the length of haul is approximately 6½ miles, and in the Cobb's Hill district, where the haul is 2½ or three miles and the stops are widely scattered.

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*Deputy Commissioner of Public Works, Albany, N. Y.

* Continued from page 466.

### WORK METHODS.

Concerning the work methods, it was found that the chief causes of complaint, aside from irregular or infrequent collections, were the rough usage of receptacles, the scattering of refuse on walks and lawns, and—in the case of garbage collections—leaving the covers off the garbage cans after collection. The remark is made, however, that the latter is an excellent thing in that it allows sun and air to disinfect the cans and is a hint for householders to wash them thoroughly before using them again. These matters can be remedied with a little care on the part of the supervisory force.

It is suggested that the working hours and routes of the garbage collectors be adjusted to make it possible that the collectors work a full eight-hour day for six days a week; and that collections be made regularly the stipulated number of times each week for each stop, and in particular, as nearly as possible on the same day or days each week. The latter would enable householders to keep their garbage cans where the contents would not freeze in winter, setting them out only in time for collections to be made. This alone undoubtedly would reduce the number of complaints made as to rough handling and failure to remove the whole contents of the containers, and would enable the collectors to do their work at greater speed.

Greater care should be taken to prevent scattering of refuse, especially garbage, about premises and streets. This would require not only improved supervision by the department, but the provision by the public of adequate and standard containers and proper separation of refuse.

Garbage wagons should be kept covered at all times. This is merely a matter of supervision.

The unnecessary banging of receptacles, the rapid driving of noisy vehicles over rough streets and other unnecessary and undesirable noise should be eliminated, especially in the early morning hours. This also is a matter of supervision. Its accomplishment would greatly improve the feeling of the public toward the collection force.

Not only should garbage wagons be frequently and thoroughly cleaned, but the householders should wash out and thoroughly clean their receptacles each time collections are made. This is a simple matter which, strangely enough, does not seem to be given attention by many householders.

Work schedules should be arranged for ash and rubbish collection so that collections will be made from each stop with regularity and as nearly as possible on the same day or days of each week.

Care should be taken that all the rubbish possible be collected in the rubbish wagons and not drawn to the ash dumps. This is a matter not only of supervision, but one that demands improved co-operation from the public in the proper separation of rubbish from ashes in separate containers.

### FREQUENCY OF COLLECTIONS.

The frequency with which collections of refuse are made should be governed by a number of factors, each considered in relation to the others. The more important are:

1. The composition of the refuse and the degree of its separation and method of storage at its source.
2. The climate and the season of the year.
3. The character of the population and standards of living.
4. Density of population.
5. Quantity of refuse produced.
6. Method of collection and of disposal.

All of these may be summed up under the two heads of health and convenience of the public, and cost.

In the case of garbage, within reasonable limits neither the quantity produced nor the cost of collection is as important as the elimination of nuisance from the standpoint of health and convenience. For this reason frequent collection is more important in warm weather than in cold, and in southern climates than in northern ones. If public convenience alone were considered, it would probably be removed daily. Moreover, if garbage is used for feeding hogs it must be fresh, and if disposal is by reduction, frequent collection is advisable because of the increased acidity of stale garbage. On the other hand, roughly speaking, it costs half again as much to make semi-weekly collections as it does to make one collection a week, and the cost of three collections is at least twice the cost of one per week.

If ashes are collected separately, the frequency can be governed almost entirely by the convenience to the public and cost to the householder and to the city. There is some saving effected in making collections if the ashes are allowed to accumulate to some quantity before removal. Where they must be removed from the premises, however, it costs proportionately almost as much per unit of quantity to make a collection where there are four or five filled receptacles as where there are only two or three. The less the frequency of collection the greater must be the number of receptacles used by the householder and consequently the greater the cost to him.

The frequency with which rubbish should be removed depends largely on the nature of the material and the quantity produced. If garbage is mixed with the rubbish, even to only a slight extent, it soon has objectionable odors. (This is true if cans and containers used for the storage of food are included with the rubbish.)

If the rubbish is kept exposed to the weather it becomes wet and soggy and paper materials lose much of their salvage value. Also, frequent collections are necessary from the standpoint of public convenience. Rubbish usually accumulates rapidly and, unless collected at comparatively frequent intervals, is liable to become a nuisance or a dangerous fire hazard.

There seems to be no generally adopted practice with reference to frequency of collection. In most cities it seems to depend upon the amount of equipment and funds available.

In the Rochester report the following is recommended:

1. In the *business districts*, *daily* collections of *all classes* of refuse should be made throughout the year, as at present.

2. In the *residential districts*:

a. *Two* collections of *garbage* should be made each week during the months of May, June, July, August, September, October and November, and *one* collection each week during the months of January, February, March, April and December. No stop in the residential districts should be given service oftener than twice a week, unles it can be proven that such service is absolutely necessary. It is important, however, that two collections be made each week in *all* parts of the city during the summer months, rather than that certain sections shoulud receive more frequent service than others as is the case at present.

b. *One* collection of *ashes* should be made each week during the months from October to May, inclusive, and one collection in every two weeks during the summer months from May to September, inclusive. The exact time for changing from the weekly to semi-monthly collections, or vice versa, cannot be determined in advance; it will vary with the season. Usually, however, the change from the weekly to the semi-monthly schedule should be made sometime shortly after the first of May, and the change from semi-monthly to weekly collections should be made about the middle of October.

c. *One* collection of *rubbish* should be made every week throughout the year.

### AMOUNT OF REFUSE.

As a general rule, the maximum quantity of garbage is produced in the late summer and fall months, and the minimum production occurs during the winter months.

Obviously the maximum quantity of ashes is produced during the cold winter months and the minimum quantity in the summer. The production of rubbish is fairly uniform, but there is some variation, the maximum amount being produced in spring and the minimum during the winter months. The quantities of refuse colected in Rochester during 1916 and 1917 are shown in the form of curves on the accompanying diagram.

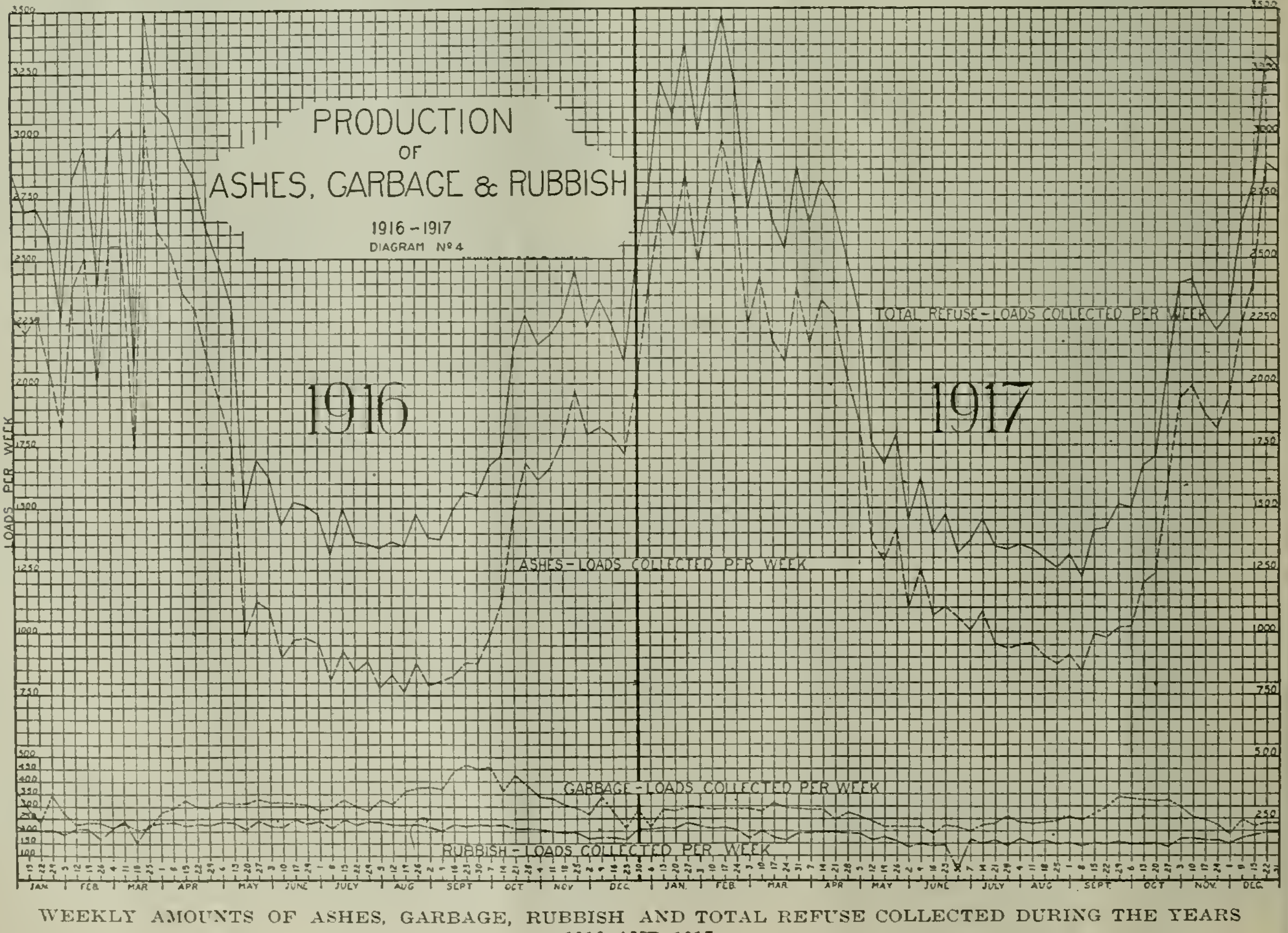
Approximately 31,724 tons of garbage were hauled to the reduction plant in 1916 and 25,949 in 1917, the smallness of the latter figure being due probably to the high prices of food materials and patriotic war conservation. Part of the decrease, however, was due undoubtedly to the greater activity of private collectors in removing an increasing percentage of garbage for feeding to hogs or other private uses. The maximum quantity of garbage is produced during a short period in the months of September and October, when for two or thre weeks production is practically twice what it is during most of the rest of the year.

It is interesting to note how closely the variations in the curve correspond for similar periods during the two years. A high point is reached for the week ending April 15, 1916 and a similar point for that ending April 28, 1917. Another high point is indicated in July of each year. There is a slight decrease for two weeks in August and a sudden decided increase about September I. Also in each year a decided increase in the week following Thanksgiving. These indicate the effect of feast days, canning seasons, berry time, etc. on garbage production.

ESTIMATED PRODUCTION OF REFUSE IN ROCHESTER.

| Class of Refuse | —Tonnage per Week— Average | Maximum | Minimum | —Average Production per Year— Pounds per capita | Pounds per stop | Per cent of total | —Pounds Produced per Stop per Week— Average | Maximum | Per cent of Average | Minimum | Per cent Average |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ashes .......... | 3,800 | 6,000 | 2,000 | 1,520 | 8,380 | 82.6 | 161 | 254 | 158 | 85 | 53 |
| Rubbish ....... | 200 | 250 | 150 | 80 | 440 | 4.4 | 9 | 11 | 122 | 6 | 67 |
| Garbage ....... | 600 | 950 | 450 | 240 | 1,320 | 13.0 | 25 | 40 | 160 | 19 | 76 |
| All refuse ...... | 4,600 | 6,700 | 2,800 | 1,840 | 10,140 | 100.0 | 195 | 284 | 146 | 119 | 61 |

NOTE.—The maximum quantity of ashes is produced during the months of January, February and March; the minimum quantity is produced during the months of June, July, August and September. The maximum quantity of rubbish is produced during the months of April, May and June; the minimum quantity is produced during the months of November, December, January, February and March. The maximum quantity of garbage is produced during the months of September and October; the minimum quantity is produced during the months of February and March. The maximum quantity of all refuse together is produced during the months of January, February and March; the minimum quantity is produced during the months of June, July and August. The estimated tonnage per week is based on the quantities collected in 1916 and 1917. Per capita production is calculated for an estimated population of 260,000. Per stop production is calculated for 47,200 stops, the number counted in the receptacle canvass made March 13-19, 1917.



WEEKLY AMOUNTS OF ASHES, GARBAGE, RUBBISH AND TOTAL REFUSE COLLECTED DURING THE YEARS 1916 AND 1917.

In the accompanying table the authors of the report have made an estimate of the amount of refuse to be provided for in Rochester, based on the quantities collected in 1916 and 1917. The average maximum and minimum estimated tonnage per week are indicated for each of the three classes of refuse separately and for all together. The maximum production of combined refuse is not as great as the sum of the maximums of the three kinds separately, nor is the minimum as small as the sum of the three minimums, since both minimums and maximums of the three different kinds of refuse occur at different times of the year, the maximum quantity of garbage, for intance, being produced during the season of lowest production of ashes.

The amount of ashes collected is more than 80 per cent by weight of all the refuse. The variation in the quantity of ashes is much greater than the variation in either of the others, the maximum production of ashes being 158 per cent of the average and the minimum only 53 per cent, while the maximum production of rubbish is 122 per cent of the average and the minimum 67 per cent. The maximum production of garbage reaches 160 per cent of the average, but only for a very short time, and the minimum garbage is 76 per cent of the average. The estimated annual production of garbage is 240 pounds per capita, of rubbish 80 pounds, and of ashes 1,520 pounds. It is estimated that the average quantities per stop per week are 161 pounds of ashes, 9 pounds of rubbish and 25 pounds of garbage.

*(To be continued.)*

## NIAGARA FALLS AND WATER CHLORINATION.

### Method of Manufacturing Hypochlorite and Liquid Chlorine—Development of Apparatus for Applying the Latter—Extent of Use.

A paper was read before the convention of the American Water Works Association by John A. Kienle entitled "The Relation of the Chemical Industry of Niagara Falls to the Water Works," the first part of which paper was devoted to a more or less general account of the electrochemical industries at Niagara Falls that are of more or less direct benefit to water works.

The total potential power of the falls is given as six million horse power. The United States is now using about 375,000 electric horse power generated at the falls, of which 44,000 is used in the electro-chemical industries and 35,750 is used by municipalities. Among the products made possible by this electric energy are aluminum, abrasives, calcium carbide, ferrosilicon and other ferro alloys; and tungsten, and numerous other substances, alloys and chemicals are produced by means of this electric energy.

The major interest of the author and of water works men generally, however, centers in the manufacture of liquid chlorine and bleaching powder. Bleaching powder is made by passing chlorine gas over hydrated lime, the lime being spread in ridges on the floor of a chamber or room so as to expose as large a surface of it as possible to the action of the chlorine. There are several chambers in series, and the gas that is not absorbed by the lime in the first chamber is turned into others in succession until the emerging gases are free from chlorine. The lime absorbs 35 to 40 per cent of chlorine, and when the gas has been removed from the chamber it is shoveled through a chute into drums or barrels. Hypochlorite, when exposed to air, loses its chlorine strength rapidly, and even when sealed in drums decomposition occurs, especially in hot weather.

Chlorine was liquefied commercially in Europe about 1889, but its manufacture was not successful until pure chlorine gas was obtained by use of the electrolytic cell, in which the electric current breaks up common salt into chlorine and caustic soda. There are two types of cells in actual use, one in which the two electrodes are separated by a porous partition or diaphragm, and the other a cell in which there is no diaphragm, but in which mercury cathode dissolves the sodium metal as it is formed.

Of the first type or diaphragm cell there are many varieties, those most commonly used in this country being the Nelson, Allen-Moore, Wheeler, Townsend, Dow and Billiter. The main points of difference between them lies in the disposition of the diaphragm and the anode, which is in all cases of Acheson graphite. The chlorine formed at the anode in any of these cells is much purer than that formed by the older chemical process, running from 40 per cent to 98 per cent chlorine, with a small percentage of carbon dioxide, oxygen, and in some cases hydrogen.

Pure chlorine gas condenses to a liquid at ordinary atmospheric pressure at —34° centigrade, and at ordinary temperatures (about 15° centigrade) becomes a liquid at a pressure of six atmospheres. If the gas contains less than 100 per cent of chlorine, either greater pressure or lower temperature, or both, is required. Chlorine when dry attacks few of the metals, but before drying must be handled in lead or stoneware conduits and containers. Before compression, the gas is dried in coke or stoneware-packed towers by the use of stronge sulphuric acid, which absorbs the moisture but dissolves only a small amount of chlorine. Pressure is used to liquefy the gas, different means for obtaining the pressure being employed. some being similar to air compressors, and others depending upon the head of a falling stream of sulphuric acid to give the necessary pressure, a tower 75 to 100 feet high being used for this purpose. After being compressed, the chlorine gas is cooled by mechanical refrigerator machines to from —30° to —70° centigrade. The chlorine gas so liquefied is drawn off into cylinders or other containers for shipment.

The writer believed that the use of chlorine for sterilizing public water supplies has been the most noteworthy single contribution to the art of water purification in recent years. This use of hypochlorite was first carried out successfully by George Johnson at the Chicago stock yards in 1907, and was adopted so rapidly by water plants that by the end of 1911 approximately 500 water plants had been equipped with a hypochlorite installation and close to one billion gallons of water thus sterilized. The introduction of chlorination settled at once, and apparently for all time, the much mooted controversy between sanitary engineers on the question of the suitability and ultimate efficiency of rapid and slow sand filtration as the correct means of water purification.

It is perhaps purely coincidence that in 1911 and 1912 there was a temporary interruption in the downward trend of the country's typhoid rate which has been caused, it is believed, by the use of hypochlorite. The writer believes, however, that the use of hypochlorite as a sterilizing agent had about reached its maximum of usefulness because the greater part of the plants where it could be used with proper control and supervision had by this time been equipped with hypochlorite plants. The inherent disadvantage in the use of this chemical for sterilization by a small city is illustrated by the case of Xenia, Ohio. where a rather severe typhoid epidemic was due solely to the failure of the attendants in charge to realize that the hypochlorite had lost its strength. (See Municipal Journal for January 11, 1919).

The writer therefore unhesitatingly makes the deduction that it is extremely fortunate for the country's welfare that the use of liquid chlorine was developed at this time.

The first to use liquid chlorine was Major Carl R. Dowall at Fort Meyer, and this was immediately followed by commercial experiments at Niagara Falls, Wilmington, Dela., Philadelphia and Brooklyn, by several investigators operating independently. Much difficulty was encountered in controlling the gas, the progress in development of an efficient equipment passing through the several stages of:

1. Plain iron pipe filled with gravel, a measured supply of water entering the top and gas being delivered from cylinders weighed on scales.
2. Pressure-regulating valve control of chlorine pressure entering the absorption tower and ultimate measurement of chlorine water by means of a standard orifice box.
3. The later use of compensating regulating valve, orifice, and hydraulic manometer to indicate rate of gas feed. Chlorine mixed with water in an absorption jar.
4. The latest improvement, involving only compensator, indicating gauge, and water-operated injector for mixing gas and water.

The rapid growth of the use of liquid chlorine was even more pronounced than that of hypochlorite. In 1912 only one water plant, that at Niagara Falls, was equipped with liquid chlorine apparatus, but the number at the end of 1918 had reached approximately 2,500. The greatest number of plants so equipped are undoubtedly found in the more populous urban districts, particularly those in states whose boards of health are most active and efficient in their work.

The United States census figures show that in 1917 the typhoid fever death rate in the registration area, which contained a population of 41,758,000, was 30.3 per 100,000; and the estimated number of typhoid deaths in that year throughout the entire country was approximately 30,000. In 1907 there were no chlorinated water supplies. The latest figures available from the U. S. Public Health Service are those for 1917, and at this time the rate had dropped to 12.3 per 100,000, with the estimated number of typhoid deaths stated as 13,000; and in this year there were at least 2,000 public water supplies that were chlorinated. This indicates a saving of 17,000 typhoid deaths per year, to say nothing of other water-born diseases or an increase in vital resistance to other diseases as claimed by the Hazen theory. Apparently the chlorination of water has been the major factor in saving more lives in the United States during the ten years since its inception than were lost by the United States forces in the world war.

If we value a life at $7,500, this figure including allowance for lost wages, medical attendance, lowered vitality, etc., in the proportionate number of typhoid illnesses there results a saving of over $125,000,000 annually.

The figures available represent the mortality statistics of only the so-called registration area, the estimated population of which is approximately seventy million, leaving forty million for which there are no statistics. A careful investigation made a few years ago indicated that the total number of public water supplies in the United States was something more than 7,500. The 2,500 supplies that have been filtered or chlorinated are but one-third of this number, and the other two-thirds supply the smaller cities in the less populous districts. If all of the water supplies serve the total urban population of sixty million, and the number receiving chlorinated or filtered water is forty million, according to the best estimate obtainable, this leaves a balance of twenty million, the major portion of whose lives are more or less endangered by the failure of the authorities to chlorinate the water.

It is obviously unfair to take the typhoid statistics of the total registration area as a basis for computing figures on water treatment, since these figures include the death rates of rural districts as well as of cities. In order to obtain an idea of the effect of chlorination on the urban typhoid statistics, the figures for 57 principal cities have been compiled from statistics of the Journal of the American Medical Association. These show that the average typhoid rate in these cities in 1908 was 28, while in 1918 the rate had dropped to 6.2.

If, however, we assume that the death rate in those municipalities not receiving purified water approximates even the low average condition existing in the total registration area in 1917, the annual loss of life in the twenty million urban population is not less than 2,500. This represents a loss annually of $18,750,000, which is six per cent on $312,500,000. The cost of installing five thousand additional chlorination plants would certainly not exceed $3,000,000, and the interest, depreciation and operation charges would not exceed $750,000. Compare this with the annual loss in vital capital.

It has been stated that the chlorination of public water supplies is the cheapest municipal insurance that can be obtained. For a municipality of five thousand or less the annual expense to the municipal government would be about $36.50 for operating, and $120 for depreciation at the rate of 20 per cent, or a cost of three cents per capita if the population is 5,000.

If we take the four principal states in the metropolitan area, New York, New Jersey, Pennsylvania and Connecticut, we find the following facts:

In New York in 1908 the death date was 16 and in 1918 it had fallen to 5.4; approximately 1,200 less deaths a year from typhoid. There are in the state 510 public water supplies serving a population of 8,700,000 out of a total population of 10,682,000; 125 of the supplies are either filtered or chlorinated or both, these serving 7,000,000, and leaving 1,700,000 served by 385 supplies whose water is not properly protected, giving an average of 4,400 population to each such supply.

In Pennsylvania the total rate in 1908 was 32.4 and in 1918 had fallen to 10. Out of a total population of 8,750,000 in the state, less than 4,000,000 receive purified water; and less than 140 out of a total number of supplies of 1,200.

In Connecticut only 24 supplies out of 104 are being treated today, but the death rate has fallen from 18.4 in 1908 to 5.3 in 1918.

New Jersey lost 408 of its citizens from typhoid in 1906, but reduced this loss to 162 in 1918. However, out of a total of 184 surface water supplies (69 underground supplies being eliminated), only 36 are chlorinated.

The writer presented two charts, one showing the reduction in Philadelphia, Baltimore, Pittsburgh, Cincinnati and Minneapolis, in which cities the water is both filtered and chlorinated, and the other showing the reduction in New York, Jersey City, Buffalo, Chicago and Milwaukee, in which the water receives no treatment except chlorination. The writer's purpose was to show that, so far as reduction in typhoid mortality goes, chlorination is quite as effective as filtration. "It is not, however, the writer's intention to create the impression that chlorination is to be in the slightest way considered as a substitute for filtration. There are today no doubt many chlorinated water supplies that should be filtered. The use of chlorine does not in any way change the physical or chemical characteristics of the water. It will not rectify the water from the standpoint of appearance, as it will remove neither turbidity nor other suspended matter and its effect upon color is almost negligible. The important point, however, is its known bactericidal action and the absolute safety of the treated water for drinking purposes."

But while chlorination is not a substitute for filtration, neither should filtration be considered a substitute for chlorination. Dangerous bacteria remaining in the filtered effluent should be destroyed by chlorine and the water rendered sterile.

# SANITATION AND MUNICIPAL DEATH RATES*.

### Personal Precautions, Board of Health Work and Sanitation Compared—Development of Municipal Sanitation—Cost and Results.

By GEORGE A. SOPER, Ph.D.†

If we take up a consideration of the ways in which communicable diseases of different types have been combatted, we will note that there have been three general fields of effort. It is necessary to consider them all in order that the field occupied by sanitation may be viewed in its proper relations.

#### SANITATION COMPARED WITH OTHER HEALTH MEASURES.

The first may be called the field of personal precautions. Whether the effort is made in the city or country, in the tropics or temperate zones, in highly civilized countries or in the remote parts of the world, the essential elements of these precautions are the same. The reason for this is that they are based on purely personal instinct—purely personal experience—and little else.

Every one exercises certain precautions, consciously or unconsciously. They are a part of the education which we get in the school of experience. We learn to avoid the presence of the infectious sick and such common causes of illness as undue exposure, excessive fatigue and improper food.

The second field of effort in the control of disease is board of health work. The intention here is for the government, national, state and municipal, to exercise a wholesome supervision over the public health. This is done by the enforcement of laws and ordinances which relate to the collection of statistical and other data to indicate the birth and death rates and the prevalence of infectious and other causes of death. To attain their greatest value vital statistics should record the cases as well as the deaths, but we have not yet reached that point of development where the importance of this matter is generally appreciated.

Board of health work includes, beside the collection, tabulation, interpretation and publication of statistical facts relating to population, sickness and death, the supervision of food and drugs, the regulation of quarantine, the performance of vaccination and inoculation for the prevention of disease, the distribution of curative sera, and the sanitary education of the public through bulletins, lectures, reports and other methods of publicity. Education as a means of reducing the death rates is one of the most promising of all public health measures, but so far it is in its infancy.

The third great field of effort is that of sanitation. Sanitation is mentioned last here although it is, in point of fact, the most important. It is preeminent for a number of reasons.

By sanitation is meant that branch of systematic health work which requires plant and a force to maintain it. Examples are works for the procurement and distribution of wholesome drinking water, the collection and disposal of liquid sewage and the gathering and final disposition of kitchen waste, ashes and other discarded material. These are obviously sanitary undertakings but the list of improvements which go to make a city sanitary does not end here. Broad, well paved market places; suitable playgrounds; bright, well ventilated schoolhouses; in short, whatever the city has in the way of plant which goes to prevent the injuries to health which result from too densely segregated masses of people might properly be comprised under the head of sanitation; but in every-day parlance they are not so included.

Yielding to works of sanitation are not only typhoid, dysentery, and other diarrheal diseases, but many other forms of sickness. To introduce a public supply of pure water in place of a polluted one, or to build a sewerage system in a town which has had no good way of disposing of excrement, is to reduce the prevalence of nearly every disease from which men suffer and die. Nothing that can be done is so certain to lessen the death rate.

It would be interesting to know exactly the extent to which sanitation decreases municipal death rates, but the effect cannot be stated in numerical figures. Municipalities which are so backward as not to possess good sanitary works are usually too backward to know how much preventable sickness and death they have. And unless we know the sickness and death rates before and after the introduction of a sanitary improvement it is impossible to say precisely how great the benefit is.

Sanitary works possess a number of advantages as compared with other measures for the prevention of disease. For one thing, they do not require as high a degree of skill in their administration as do boards of health. For another, they have an advantage over personal precautions in not being individual in application and unco-ordinated in action. Sanitary works have a wholesale application. A water supply which is pure is wholesome for every person who has occasion to use it. The street that is well paved and kept clean is of advantage to every one who travels over it by vehicle or foot. And sanitary works do not hide their merits under a bushel. Their good effects are in plain sight—a constant recommendation of the good sense of those who are responsible for the welfare of the community.

#### HOW THE SANITARY DEVELOPMENT OF THE MODERN CITY HAS BEEN ACCOMPLISHED.

To trace the progress of sanitation in Europe and North America is an instructive undertaking for this history contains many useful lessons. In both continents a deliberate intention exists to regulate the growth of cities along lines which make for order, convenience, comfort, safety, health and beauty. From the first, sanitation has been a feature of many American cities. Sanitation, although long delayed, when it came, came like a revolution to the continental cities of Europe.

The beginnings of municipal sanitation everywhere are due to European initiative. Public water supplies, as we know them today, and sewers to carry away the most offensive and dangerous part of a city's filth, are a recent European contrivance. Street lighting, good pavements, adequate transportation, tenement house reforms, the construction of parks and playgrounds, the regulation of vehicular travel and street paving and cleaning have been developed more recently. The American city which ignores foreign practice in these directions fails to take account of experience which can save it a great deal of money.

The sanitary regeneration which European cities have experienced has had no counterpart in the United States. There has been no necessity for such revolutionary changes. American cities were small when the world began to learn that sanitation was an indispensable feature of every municipality. There was never such overcrowding, such slums to clean, such foci of filth to clear up and eliminate, as existed abroad half a century ago. In 1860 there were only sixteen cities in the United States with a population of 50,000 or more, as against one hundred and forty-eight in Europe.

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*Paper before Second Pan-American Commercial Conference, June, 1919.

†Major, Sanitary Corps, U. S. A.

The significant feature of municipal growth in America as compared with that in Europe has been less the reconstruction of cities already large than the construction of a great number of small cities. Hundreds of these have passed and are now passing through their periods of infancy, youth and adolescence toward a maturity which foreign cities attained long ago. Their sanitation takes place as they grow.

The first important sanitary improvement to be made in the growing village is the public water supply. This leads to the use of water closets and, to accommodate the drainage from these, cess-pools are built. The privies, the original provision for the disposal of excrement, are then eliminated. Street pavements are presently considered and the cleaning of the pavement and the collection of house refuse by municipal effort follow. At first garbage is collected by scavengers at the private expense of the householders; later it is done at public expense. The young city may now be said to have passed through its period of infancy and entered that of youth.

A sewerage system is built later in the city's growth. During this period the houses are gradually built closer to one another and in a more permanent form of construction until they stand in a compact mass. More attention is given now to pavements and to the cleaning of them. Parks are laid out, lighting is improved, ordinances are passed regulating many sanitary matters. The city has now reached its period of adolescence.

The period of maturity, that is the period in which civic responsibility begins fully to express itself, comes last. The regulation of building construction, the control of traffic and the adoption of farsighted plans to insure public health and safety are often taken up at this time. They should have been considered at a much earlier period. It is always easier to carry out a plan which has been made before-hand than one which has had to be prepared after permanent constructions and settled procedures have for some time been in existence.

### HOW TO GET BETTER SANITATION.

It is instructive to observe how often it is that a community owes its sanitary improvements to its business men. It might be supposed that the principles of sanitation were more within the grasp of professional men than of those whose attention was chiefly occupied with manufacture and trade, and that doctors and lawyers and ministers would be foremost to see that the health and welfare of the public were properly looked after. This is not, however, always the fact. There is no disposition to belittle the help which professional men can give, but an experience in public work which covers many years and extends over many cities and states shows that when it comes to municipal improvements, it is the commercial element which usually exercises both the initiating and sustaining influence.

The explanation of this is simple enough. The general subject of sanitation is not so complicated as to be the exclusive province of any class or profession. Certainly the need of sanitation and the benefits of it can be understood by every intelligent person. Business men are accustomed to weigh returns against expenditures and readily appreciate that sanitation is a sound investment. Moreover they are accustomed to action and when they get together to obtain action for the public welfare they are apt to get it.

Often the important thing to know is what to do in order to improve the sanitation of a city. Why is the death rate high? What should be done to reduce it under the particular circumstances which exist? In answering these questions many technical and financial details may have to be considered. This is properly the work of experts. An unprejudiced expert should be called on to make a report based on a study of the local situation and on a knowledge of what other cities have done and are doing under similar circumstances. This report should serve as a program behind which the solid common sense of the municipality can array itself.

When a city needs a health program, as every city does, the best way to get it is for the business men to demand it of the municipal administration through their commercial organizations. If the municipality does not possess the talent for the work, an expert should be called in from outside. In many cases commercial organizations have themselves employed experts to make investigations and reports, to serve as a guide to the citizens in demanding what is proper.

The question is often asked, what can a city afford to spend for sanitation? The answer is that it can afford to spend whatever is necessary in order to make it healthy. If it is already healthy, it need spend but little; if it is unhealthy, it must, of course, spend more. A city, like a man, must have health, if it is fully to realize its possibilities. Epidemics paralyze business, and a high death rate is a reflection upon the good business sense of a community. In many cases investments for sanitation should be looked upon as policies.

Every city and every village ought to have a program of development; a plan to build to, a settled scheme of construction to refer details to. This program should be prepared early, in order to keep the growth properly proportioned, and prevent the excessive development of some relatively unimportant features at the sacrifice of the essential. Paramount in such a scheme should be suitable provisions for health.

Although a considerable investment of capital has to be put into sanitary works, the maintenance charges are not excessive as compared with the administrative costs of hand labor, which is often used as a substitute to accomplish the same result. It must not be expected, however, that good sanitary works can be built or that they can be effectively operated without care. Skill and attention in design and construction and operation are indispensable to the best results.

Although no attempt will be made here to show what large investments are made by every up-to-date city for the purpose of sanitation, it may interest some to know what share of the total yearly outlay is devoted to this purpose by the cities of the United States.

Among the 219 cities of 30,000 or more population in the United States, for every ten dollars put out each year for all purposes of administrative effort, one dollar and ten cents on the average is expended for health and sanitation. The amount varies among the different cities, according to the natural advantages of the site with reference to water supply, drainage, kind of population and commercial and industrial conditions, and according to the foresight and business ability with which the work is planned and carried out. The percentage of the total yearly expenditure which is devoted to health and sanitation sometimes runs as high as twice the figure stated, and occasionally falls to about one-half of it. The size of the city does not affect the per cent.

# NEWS OF THE SOCIETIES

**Aug. 26-28.—LEAGUE OF CITIES OF THE THIRD CLASS IN PENNSYLVANIA.** Twentieth annual convention, Allentown, Pa. Secretary, Fred H. Gates, city clerk, Wilkes-Barre, Pa.

**Aug. 27-29.—VIRGINIA STATE FIREMEN'S ASSOCIATION.** Thirty-third annual meeting, Charlottesville, Va. Secretary, E. K. Landis.

**Oct. 27-30.—AMERICAN PUBLIC HEALTH ASSOCIATION.** Annual meeting, New Orleans, La. Secretary, A. W. Hedrich, 169 Massachusetts ave., Boston, Mass.

**Nov. 12-14.—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS.** Annual convention, New Orleans, La. Secretary, Charles C. Brown, Springfield, Ill.

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### American Association of Engineers.

The American Association of Engineers has granted a charter for a club to petitioners and members from Sacramento, Cal. It is expected that a local chapter will follow shortly. W. B. Carruthers was elected president, R. A. Bergman, vice-president, and H. A. Lathrop, secretary.

The Omaha, Neb., Chapter of the American Association of Engineers recently elected the following officers for the coming year: President, W. R. McKeen, president McKeen Motor Car Co.; first vice-president, J. H. Houghton, contract engineer, U. P. Co.; second vice-president, J. A. Bruce, city engineer, Omaha; secretary, E. Trimble, C. E. contract dept., U. P. Co.; treasurer, W. J. F. Sackriede, C. E., contract dept., U. P. Co. Board of Directors: A. C. Anderson, consult, mech. engr., Omaha; E. H. Hagensick, elect. engr., U. P. Co.; Capt. H. E. McClintock, asst. engr., city of Omaha; R. E. Savage, C. E., U. P. Co.

A permanent organization of the Portland, Ore., Chapter has been affected and the following officers elected: President, W. H. Marsh; first vice-president, A. H. McKeen; second vice-president, T. W. Saul; third vice-president, O. Laurgaard; secretary, R. W. Barnes; treasurer, C. F. Thomas.

A committee of the Oregon Society of Engineers has been appointed by its executive board to work out detail plans for amalgamation with the American Association. Tentative plan has been drawn and was submitted to the national board of directors of A. A. E.

A petition has been received for an Oklahoma Chapter, signed by 44 prominent engineers at Oklahoma City. The officers are: President, Fred L. Verity, asst. div. engr., M. K. & T. R. R., and secretary, Erle K Ramsey, office engineer, city of Oklahoma. C. E. Drayer, the national secretary of A. A. E., spoke at a meeting of the Oklahoma Chapter on June 2 and installed its charter.

A charter has been granted to the Charlotte, N. C., Club of the American Association of Engineers. J. A. Killian, res. engr. of the Southern Railway, has been elected president and G. T. Asbury, office engineer, Southern Railway, secretary. It is expected that a strong chapter will shortly follow.

The Dayton, Ohio, Club of the American Association of Engineers has been organized and the following officers elected: President, E. J. Correll; vice-president, G. Calvert; secretary, H. Gellin; treasurer, L. E. Ettinger.

The Municipal Section of the St. Louis Chapter of the American Association of Engineers has been organized with the following officers elected: E. Paffrath, chairman and George Grimm, Jr., secretary of the St. Louis Chapter, secretary. One vice-chairman will be elected from each of the five city departments.

### Conference of Health Authorities.

The seventeenth annual Conference of State and Territorial Health Authorities with the Public Health Service was held on June 4 and 5, 1919, in Washington, D. C., with Surg. Gen. Rupert Blue in the chair. Forty-one states were represented at the conference.

The following resolution indorsing the principle of federal aid extension in rural sanitation, was unanimously adopted by the conference:

> Resolved, that it is the sense of the conference of the United States Public Health Service with the state and territorial health authorities meeting in Washington, June 4 and 5, 1919, that on account of the greatly accentuated popular findings by draft boards of widespread physical impairment among millions of apparently healthy registrants, and because of the present pronounced restlessness of rural local governments for breaking away from their former attitude of indifference to adequate measures of human conservation and in undertaking with or without the guidance of experienced health agencies, hastily prepared and varied programs of rural health work, that the present moment is, of all times, the most opportune and crucial for federal and state health authorities to take steps for assisting local rural governments in the development of an economic, efficient and permanent system of rural health work; and,
>
> Be it further resolved, that it is the sense of this conference that the best means for insuring the future of rural health work is the federal aid extension principle of government (the wisdom and practicability of which has been demonstrated and established in providing for other rural needs, as in the matter of post roads, vocational education, and farm life demonstration work), as represented in H. R. 2845 recently introduced in the present Congress and entitled "The Rural Health Act."

The conference dealt primarily with questions involving the reorganization of public health activities following the war. Among the subjects which were taken up were malaria, child hygiene, problems in interstate health work, control of venereal diseases, public health education, the Sanitary Reserve Corps of the Public Health Service, railroad sanitation, and statistics relating to the 1920 census. Standing committees on morbidity returns, sanitation of public conveyances, rural sanitation and trachoma, made their reports, and a special progress report was made by directing zoologist (reserve) C. W. Stiles, chairman of a commission appointed by the Surgeon General to study the problem of sanitary disposal of human excreta in unsewered communities.

Among the interesting features of the conference were addresses by judge J. H. Moyle, Assistant Secretary of the Treasury, in charge of the Public Health Service, Col. W. H. Welch, a representative of the Public Health Service at the recent conference of Red Cross societies held at Cannes, France, and Dr. D. Z. Dunott, chairman of the committee on health and medical relief of the United States Railroad Administration.

Reports from the following standing committees were received: Morbidity Returns, Dr. Eugene R. Kelley; Sanitation of Public Conveyances, Dr. Oscar Dowling; Rural Sanitation, Dr. W. S. Rankin; Trachoma, Dr. John McMullen.

A progress report of the commission appointed by the Surgeon General to study the problem of sanitary disposal of human excreta in unsewered communities was presented by Prof. C. W. Stiles.

Other subjects taken up were:

Malaria: "Its Importance—National and State Problems Involved," "Necessity of Co-operative Plan of Attack Between Federal and State Governments."

Child Hygiene: "Necessity for a Nation-Wide Program of Child Hygiene by Co-operative Work Between the Federal and State Governments."

Statement by Col. W. H. Welch on League and Red Cross Societies.

Problems in Interstate Health Work: "Control of Water Supplies Used in Interstate Traffic." "Control of Interstate Spread of Disease."

Public Health Education—Program for co-operation with States.

The Sanitary Reserve Corps of the Public Health Service: "Discussion of Best Methods of Organization and Usage, with Particular Reference to State Health Departments."

Problems of Railroad Sanitation.

Statistics, 1920 Census.

Control of Venereal Diseases as a National Problem.

### General Engineering Congress.

Arrangements have been made for a general engineering congress to be held in Batavia, Java, in May, 1920. It will deal with harbors and means of communication (including railways, tramways, telegraphy, and telephony); irrigation, drainage, waterworks, etc.; roads and bridges, town planning, architecture, etc.; the production of energy, electricity, and industries (including ironworks, factories and agricultural industries); mining and geology. It will deal with other subjects also, such as technical education, labor questions, building materials, and aerial navigation. Invitations have been issued to engineers bordering on the Pacific and Indian Oceans. The

(*Continued on page* 12)

## INDUSTRIAL NEWS

### Well-Known Engineers on Asphalt Association Staff.

Foremost federal, state and municipal engineers are included in the newly formed staff of the Asphalt Association, whose headquarters have been established at 15 Maiden Lane, New York City, under the direction of J. E. Pennybacker, the secretary. There will be a research and technical department managed by Prevost Hubbard, chief of the research and testing division of the United States Bureau of Public Roads prior to his affiliation with the association. Mr. Hubbard is one of the leading authorities in the United States on research work in all classes of bituminous materials and is the author of standard text-books on the subject.

Field engineers who will devote their attention to aiding state, country and municipal authorities in the working out of their highway problems, include Fred W. Sarr, who was deputy state highway commissioner of New York in charge of the maintenance, repair and reconstruction of all state and county highways comprised in New York's system. He has especially studied the questions of durability of types of highways, the service conditions which highways must withstand, and the relative cost of capital outlay and upkeep of all types of highways.

A. T. Rhodes, for years street commissioner of Worcester, Mass., and later secretary of the Granite Paving Block Manufacturers' Association, and who is vice president of the Massachusetts Highway Association, will look after the New England territory and other eastern points. Mr. Rhodes' practical experiences included the design and installation of the city asphalt plant at Worcester and the construction of the asphalt pavements of that city.

At the Chicago office of the association, J. B. Hittell, formerly city engineer of Chicago and president of the Illinois Society of Engineers, will be in charge of the work in the middle western states.

Shortly a branch office will be established in Atlanta and at other points and announcements will be made of the engineers selected for the various posts.

Saving the many thousand miles of waterbound macadam roads on main routes of travel by economically utilizing the existing surfaces for foundations will be an important field for the efforts of the association's engineers. The utilization of local materials to the fullest extent in combination with asphalt so as to cut down freight costs on imported materials, will be another phase of construction to be given close attention by the association. Improvement in methods, speeding up of deliveries, betterment of product, aiding the working out of thorough inspection facilities, obtaining and giving out useful data to the public officials and contractors will form some of the other lines of activity of the organization.

**The Sullivan Machinery Co.,** Chicago, is pleased to announce the establishment of a new branch office at room 810, Park Building, Cleveland, Ohio, under the management of Ralph T. Stone, for several years past, sales engineer associated with the New York office of this company.

O. S. Tweedy, who has been prominently associated with the tire industry, for the past twenty years, formerly with the Diamond Rubber Company, and during the past ten years with the United States Tire Co., who resigned from that position to accept a position as vice president with the L. A. Young Industries, Inc., Detroit, Michigan, has decided to return to the tire business in the capacity of vice president for the **Dryden Rubber Company,** of Chicago.

### Well-Known Pipe Foundries Merged.

**The Iron Products Corporation,** New York, recently incorporated in Delaware with capital of $3,000,000, has established offices at 90 West street. Plans have been perfected for the merger of the **Essex Foundry,** Murray Street, Newark, N. J., and the **Central Foundry Co.,** with works at Newark, Baltimore, Medina, N. Y.; Vincennes, Ind.; Anniston, Bessemer and Holt, Ala., with the new company. The Essex Foundry has specialized in the manufacture of cast-iron pipe steam and kindred products, while the Central Foundry Co. has been producing similar pipe products, cast-iron fittings and general castings. It is proposed to arrange for an immediate operating capital of $1,000,000. Mr. Harder, head of the Essex Foundry, will become president of the corporation; Bayard H. Faulkner is secretary.

**The Blaw-Knox Company,** Pittsburgh, Pa., is to move its Wheatland, Pa., plant to Hoboken, N. J., where it has large interests. The work of dismantling is now in progress. The site and buildings have been bought by the Sharon Steel Mfg. Co. The building of an extension to the Hoboken plant, the Blaw-Knox Co. says, is being done for the purpose of concentrating all manufacturing at Hoboken, which has been found an advantageous point for manufacturing and shipping facilities. About half the new plant at Hoboken has been completed, and it is anticipated the entire addition will be finished within the next few weeks. The combined plants at Hoboken now under construction will contain about 30 per cent. more floor space than was available in the two separate plants. The capacity of the enlarged plant at Hoboken for the manufacture of its products will be proportionately increased. In addition to the above, the Blaw-Knox Co. is building a welding plant at Hoboken adjoining its present plant, and will specialize in this department on steel mill and chemical plant specialties. The combined plants at Hoboken will employ about 1,200 men, as against 700 men employed by the company heretofore at Hoboken and Wheatland. The manufacturing site at Hoboken covers 50 acres. In order to take care of the additional labor required, the company has purchased 15 acres of additional ground, on which houses are being erected for the use of its workmen. The Blaw-Knox Co. manufactures steel plate and special forgings, its forms for concrete sidewalk, pavement, sewer and conduit construction being widely known.

## PERSONALS

Rhodes, Frederick A., consulting engineer, San Diego, Cal., is now city engineer.

Turner, H. E., formerly assistant division engineer, Denver & Rio Grande Ry., Utah Lines, is now resident engineer in charge of concrete-highway construction, state road commission of Utah.

Allen, H. C., state highway engineer of Idaho, died at Sprague, Wash., recently. He was appointed to the position of state highway engineer a year and a half ago. Previously he was city engineer of Great Falls, Mont., and practiced as a mining and irrigation engineer.

Hoffman, Fred, contractor and engineer of Long Beach, Cal., has been appointed city engineer.

Towse, A. R., has been elected county engineer of Pensacola, Fla.

Miller, Lieut. H. E., formerly Construction Division, U. S. A., has been appointed director of the bureau of engineering and inspection, North Carolina State Board of Health, with headquarters in Raleigh.

Conrad, Harry, of the firm of Coulter & Conrad, engineers, Wheeling, W. Va., has been appointed city engineer of Wheeling, succeeding Charles C. Cook, who resigned.

## NEWS OF THE SOCIETIES

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main object is to influence the technical development of eastern Asia.

The proceedings will be conducted in Dutch and English, and it is expected that this congress in Batavia will do much toward solving technical problems, as well as toward assisting in the development of the pan-Pacific movement by the opening up of new routes and the consequent extension of trade and the dissemination of information.

The address of the secretary of the congress is Kebon Sirih 56, Batavia, Java, Netherlands, India.

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City County State

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## HENS AS ROAD BUILDERS.

A novel idea is reported from Howell County, Missouri. This is no less than looking to the hens to pay off the road bonds by means of the eggs they lay. In one voting district a "Hen Club" was formed, based on the calculation that if each woman in the district would raise three extra hens the additional eggs so obtained would bring in enough money to pay all taxes occasioned by the road bonds. That looked so easy (to the men voters, at least) that the bond issue was carried in that district by a vote of 50 to 1.

If eggs sold at the store brought the farmer's wife 48 cents a dozen, three a day would pay four per cent interest on nearly $1,100. The idea of the possibilities of small daily or weekly sums could be used to advantage in advocating many kinds of public improvements. The possibility of obtaining an abundant supply of water by merely turning a faucet instead of going to the pump or well in all kinds of weather, by day or by night, ought to be worth five cents a day to a family (without considering the greater safety to health). But this sum paid by each family in a town of 10,000 population would furnish the interest on the cost of a house connection and simple plumbing for each house and on more than $500,000 to be spent in building a water works.

## CENTRAL MIXING PLANT VERSUS PAVING MIXER.

In the July 5th issue of Municipal Journal was described a concrete road construction job where the concrete is mixed at a central station and hauled by motor truck to the road. This method of construction is a comparatively recent one and gives considerable promise for concrete road construction under certain conditions. There are many points in its favor, where conditions are such that is can be used at all: The labor force is somewhat reduced; work can be carried on at the most favorable location, thus giving great flexibility; the problems of aggregate supply are greatly reduced and stoppages due to the lack of sand or stone on the right-of-way are diminished; one handling of the aggregates is done away with; no special machinery is needed for the work.

But all the advantages are not on one side. There is the added weight of the water to be hauled, at least ten per cent; it is difficult to maintain at all times just the force of motor trucks that it is most economical to operate under the most favorable conditions, though the motor trucks may, of course, be replaced by industrial railways; where distances are long (and a central mixing plant can not always be located in the median point of the road under construction) and the roads rough, the problem of removing the packed concrete from the truck is somewhat difficult, if not costly; and last, but not least, there have been many paving jobs where one paving mixer and gang laid more road, day in and day out, than was laid in any one day on the job described, and with less men. Doubtless this is in part due to the superiority of pre-war to post-war labor (most of these jobs date back to 1915, 1916 and 1917), but it seems that the paving management of the central mixing plant job is a complicated problem, and that, in the majority of cases, the paving mixer is more suitable for the average contractor.

In the job described, good management was apparent. With the conditions under which this job was carried on —scant space alongside the road for material storage piles, labor scarce and motor trucks plentiful—the method used possessed certain and unmistakable advantages. Without doubt, the central mixing plant idea has its place, but it is too much to say yet that it has any clear-cut superiority except in more or less special cases.

## TO REDUCE TRAFFIC ACCIDENTS.

There were reported, during the year 1918, 679 deaths in New York City due to traffic accidents, or an average of nearly two a day. This seems like a large number, and if the same ratio of deaths to population were extended throughout the country the number would total more than twelve thousand a year. But Washington, D. C., with its much smaller population, reports fatal traffic accidents at the rate of 82 a year, and its ratio applied to the entire country would give a total of more than twenty-one thousand.

Assuming the low New York rate and applying it to only the half of the country's population that lives in cities we have a mortality of more than six thousand a year, with several times this number of injured, due to traffic accidents—fifteen or twenty every day of the year.

The Highways Transport Committee of the Council of National Defense (which is still functioning) is conducting a campaign of education, the aim of which is to place basic suggestions as to safety regulations before the municipal authorities of the country, suggesting that they be embodied in local regulations. It believes that educational campaigns will be even more effective and cost very much less than enforcement of the regulations. In the past four years the number of deaths from traffic accidents in New York has been practically uniform in spite of increase in population and in traffic, while those in Washington have increased nearly 150 per cent. The committee attributes this to better enforcement of regulations in New York, but believes that the New York rate could have been cut considerably by securing, by education, voluntary rather than enforced observation of traffic rules.

In connection with its campaign the Highways Transport Committee is endeavoring to compile data relative to the number of accidents due to automobiles in the cities of the country, and will appreciate receiving from any one such information for a given city or cities and covering a stated period of time, preferably a month.

# GUARANTIES FROM CONTRACTORS

### Opinions of Courts in Various States as to Bonds or Retained Percentages to Insure Maintenance of Pavements—Most Courts Hold Them to Be Guaranties of Quality of Work Only.

By J. SIMPSON.

It is a matter of common knowledge that the usual method of making street improvements places upon the abutting owners the cost of the paving, or the construction cost, while the cost of ordinary repairs, or maintenance cost, is borne by the city. And, as is well known, it is a common custom to require from a contractor for the paving of a street, that he will maintain the pavement in repair for a period of years. This is usually done by taking a bond or stipulating for the retention of a percentage of the cost of the work. When this is done, does it throw the cost of the repairs, or any part of the maintenance, upon the abutting owners instead of the city, or is it a mere guaranty of the quality of the work? The majority of the cases hold that if the provision is limited to repairs made necessary by improper workmanship or by the defective quality of the material used, no additional burden is imposed on the abutting owners by the requirement of a guaranty for a reasonable length of time, and such a provision is valid. Latham v. Wilmette, (1897) 168 Ill. 153; Cole v. People (1896) 161 Ill. 16; Shank v. Smith (1901) 157 Ind. 401 (seven years); Osborn v. Lyons (1897) 104 Iowa 160 (five years); Diver v. Savings Bank (1905) 126 Iowa 691 (one year); Durbert v. Cedar Falls (1910) 149 Iowa 489 (five years); Kansas City v. Hanson (1899) 60 Kan. 833 (five years); Barber Asphalt Paving Co. v. Yaar (1903) 115 Ky. 334 (five years); State v. District Court (1900) 80 Minn. 293 (ten years); Sedalia v. Smith (1907) 206 Mo. 346 (five years); Barber Asphalt Co. v. French (1900) 158 Mo. 534 (five years); Seaboard Nat. Bank v. Woesten (1898) 147 Mo. 467 (ten years); Barber Asphalt Co. v. Herzel (1898) 76 Mo. App. 135; Wilson v. Trenton (1898) 61 N. J. L. 599 (five years); Williamsport v. Hughes (1902) 21 Pa. Supr. Ct. 443; Erie v. Grant (1904) 24 Pa. Supr. Ct. 109; American Bonding Co. v. Ottumwa (1905) C. 37 Fed. 572.

It will readily be seen that the question raised is one of considerable importance to the public, especially to the cities whose charters provide for the construction of pavement in streets at the expense of the abutting owners of real property, or the property benefited, and that the pavement, when constructed, shall be kept in repair at the expense of the city. People v. Featherstonhaugh (1902) 172 N. Y. 112.

In Bank v. Woesten, *supra*, the Missouri Supreme Court said: "Municipal officers who, in contracting for such public work, should neglect to take from the contractor some kind of guaranty of the perfection of the work and materials, would be derelict in their duty and unfitted for the trust with which they had been invested. The kind of guaranty should be left to their discretion and business sense. We think no wiser or more adequate provision for securing perfection in the completed work could be devised than that of requiring the contractor to maintain it for a reasonable time, at such cost as would compensate for the repairs necessary to preserve good work and good material from becoming imperfect from natural and unavoidable causes." And in Barber Asphalt Co. v. Herzel, *supra*, the Missouri Court of Appeals said that the taking of a guaranty for the maintenance of construction and reconstruction of streets is the exercise of sound business sagacity, and is to the interest of both the abutting owner and the city. In Williamsport v. Hughes, *supra*, it was held that it is the duty of municipal officers when contracting for a pavement, whether the cost is to be paid by the city or is to be assessed against the abutting owners, to provide for a substantial and durable improvement. And if the guaranty provision of such a contract involves no extra cost above what it would have been if the work had at first been executed according to the contract, then it must be held to be a contract of guaranty and not one for repairs.

In what is probably the latest case on the subject, Bridgeport Const. Co. v. Duffey (N. Y. 1919), 106 Misc. 252, 175 N. Y. Supp. 658, it was contended that the requirements of the specifications that the contractor guarantee and maintain the road for three years necessarily tended to impose upon the bond moneys a burden which was illegal, in that bidders would naturally present higher bids to meet the additional repair requirements, and thus indirectly the bond moneys which had been appropriated for new construction would be misappropriated for the making of repairs. The court considered that the natural effect of this guaranty clause is to increase the amount which contractors will bid for the construction of highways where the contract therefor contains this guaranty clause, and that by the terms of the specifications an attempt was made through this clause to provide, for a period of three years, for the maintenance and repair of such highways out of the funds appropriated for construction and improvement.

It was stipulated as one of the facts in this case that there was no amount added or included in the contractor's total bid price for the construction of the highway in question by reason of this guaranty clause, but the court considered that the validity of the clause itself must be determined not by the facts of that particular case, but by what was possible under it, and it attempted to provide for maintenance and repair out of funds appropriated for construction and improvement in violation of the New York Highway Referendum Act.

The court in the Bridgeport Const. Co. case held that a provision in a highway construction contract that the contractor guarantee and maintain the road for three years, authorizing the retention of a percentage of the contract price for one year after the acceptance of the work, is not "a guaranty of the quality and character of the work" such as was indicated in People v. Featherstonhaugh. Here by the stipulated facts there was an admission that it is not making good the imperfect work or materials, but is a guaranty to make repairs which "have become necessary by reason of ordinary wear and tear and causes other than defective workmanship or materials."

It is held, Bridgeport Const. Co. v. Duffey, *supra*, that a contractor, who has completed a highway and been paid everything due under his contract, except the 5 per cent retained by the state highway board under a clause requiring the contractor to guarantee the maintenance of repairs, cannot lie by and obtain the benefit of the contract, and then seek to receive the retained money and escape the terms of the agreement as to repairs, because of want of power in the highway commissioner to contract to pay for such repairs out of such moneys.

A city may require a contractor to furnish a satisfactory bond as a guaranty that he will keep a street pavement he contracts to construct in repair for a specified period (in this case 5 years) as a part of his warranty of the fitness of the material used. This does not imply that any money raised by special taxation is to be applied to the purpose of keeping the pavement in repair. Cole v. People (1896) 161 Ill. 16.

Specifications provided that the contractor should, without any extra compensation, keep in repair the curb and gutter under construction for two years after acceptance, by making good any settlement or derangement of lines or grades of curbs, gutters, and crossings, and by replacing defective materials or work in curbs, gutters, crossings, and pavements: It was held, Latham v. Wilmetto, (1897) 168 Ill. 153, that this specification was no more than a guaranty that the work had been properly done, and the contractor made the agreement to repair if defective. In estimating the cost of the improvement the commissioners did not take into consideration any cost of repairing, and this requirement was held reasonable and proper. And in People ex rel. North v. Featherstonhaugh (1902) 172 N. Y. 112, 60 L. R. A. 768, it was held that no illegal burden is placed on abutting owners required to bear the original cost of street paving, by a provision in the paving contract requiring the contractor to maintain the work for a period during which such a pavement, if properly laid, ought to wear, although the duty to repair pavements is by statute placed on the city at large. In asphalt pavement, the court said, its durability depends very largely upon the character of the work, the condition of the foundation of the pavement, and the mixture of the material used; and inspectors may be deceived in regard thereto. A guaranty on the part of the company as to the durability of the pavement affords a simple and complete remedy, which fully protects the public. In this case the guaranty was for eight years.

Portland v. Paving Co., 33 Ore. 307, *supra*, was distinguished in Allen v. Portland (1899) 35 Ore. 420, where it was held that an agreement to repair defects during five years due to the proper uses of the pavement as a roadway was plainly intended to be merely a guaranty of the quality of the workmanship and material.

But the guaranty clause of the contract relating to repairs should not go beyond a mere guaranty of good workmanship and fitness of the material intended for use in paving the street. So, where a city charter only requires the original cost of a pavement to be borne by abutting owners and leaves to the city the expense of keeping it in repair, a contract which requires the contractor for ten years to make necessary repairs not only of defects caused by material and workmanship and natural wear and tear, but also of those caused by the action of the elements, is void, and its execution will be enjoined for casting unauthorized burdens upon abutting owners in the absence of proof that the period of the guaranty was no longer than the ordinary durability of such pavement when laid with the best workmanship and material. Bradshaw v. Jamestown (1908) 125 N. Y. App. Div. 86.

The contractor is required, under such a guaranty, to make only such repairs as he should be required to make pursuant to written notice served upon him in the manner specified in the contract, if such notice is thereby provided for. O'Keefe v. New York (1903) 173 N. Y. 174; Southern Pav. Co. v. Mayor, etc., of Chattanooga (Tenn. Ch. App.) 48 S. W. 92.

A requirement by city officers of the contractor for street pavement to give a bond to guarantee the faithful performance of work, to indemnify the city against suit, loss or damage by reason of negligence or default, want of skill or care on the part of the contractor, and requiring him to guarantee and keep in repair for one year, and retaining ten per cent of the amount of the contract for one year, does not cut off full and free competition in bidding, but is a suitable and reasonable guaranty for the faithful performance of the work, and advantageous to taxpayers in safeguarding expenditures of city funds, where the work is to be paid for by proceeds of bonds already issued and sold. Dillingham v. Spartanburg (1906) 75 S. Car. 549.

In Asphalt Paving & Contracting Co. v. New York (1910) 69 Misc. 588, 127 N. Y. Supp. 794, it was held that if defects in the plan of a pavement or insufficiency of the pavement render the contract requiring the contractor to make repairs impossible of performance, both parties to the contract would be excused from further performance, and neither could recover damages for the part not performed. But the court assumed that the contractor might be entitled to be relieved of the burden of repairs on that account.

A contractor for a street improvement guaranteed that the material and workmanship should be first-class in every particular; also that he would keep the street in good repair for five years and restore and repair at his expense any defects appearing in said street within that time. It was held that these clauses should be read together and only obligated the contractor for such repairs as were made necessary by the defectiveness of the work and materials, and not from unexpected causes. Lindsey v. Browner (Ky. 1906) 97 S. W.

An agreement by the contractor to keep the pavement in repair for a specified time does not impose on him the duty of repairing the damage done by the bursting of water mains. Green River Asphalt Co. v. St. Louis (1905) 188 Mo. 576. Under a contract to repair "if any part of the pavement should become defective from improper material or construction," no liability arises on the part of the contractor unless the repairs are shown to have been necessary because of defects arising from "improper material or construction." District of Columbia v. Clephane (1883) 2 Mackay (D. C.) 155. In affirming this judgment the United States Supreme Court said: "No evidence was offered that any of the material was imperfect or improper when placed there, or that any of this construction was improperly or defectively done. We think this was necessary to enable plaintiff to recover. It will not be presumed, because the work needed repair within three years, that the material furnished by plaintiff was originally imperfect, or that the construction was not well done. . . . In the absence, therefore, of any evidence that the pavement became defective within three years from imperfect or improper material or construction used by defendant, there was no case against him, and the direction of the judge was correct." District of Columbia v. Clephane (1883) 110 U.S. 212.

Some courts, however, take a different view of such guaranties. They hold that, no matter what the period for which the guaranties run, they necessarily tend to increase the cost of the improvement and cast upon the abutting owner part of the expense of maintenance as well as the cost of construction, and so invalidate the contract in which they appear. Fehler v. Gosnell (1896) 99 Ky. 380 (five years); McAlliston v. Tacoma (1894) 9 Wash. 272 (five years); Boyd v. Milwaukee (1896) 92 Wis. 456 (five years); Excelsior Paving Co. v. Leach (Cal.) 34 Pas. 116; Verdin v. St. Louis (Mo.) 275, W. 447.

In Portland v. Bituminous Paving Co. (1898) 33 Ore. 307, it was held that a bond which covers in effect all injuries liable to arise from whatsoever source is not authorized by a statutory power to take security by bonds for the performance of contracts. In Alameda Macadamizing Co. v. Pringle (1900) 130 Cal. 226, a bond guaranteeing the work for one year from injury by ordinary use was held unauthorized, improperly increasing the property owner's burden, and that the difference in time between one and five years was only a difference in degree. To the same effect is Brown v. Jenks (1893) 98 Cal. 10, where the court said: "It is manifest that the obligation to keep the street in repair for five years is a burden which one would not undertake for nothing. Therefore a contractor would charge a higher price for the work when he was forced to contract also for repairs." These cases were approved in City of Montgomery v. Barnett (1907) 149 Ala. 119.

A well-known authority on the subject of municipal corporation II Dillon (Fifth Edition), § 829, gives the apparent reason for the conflict of the decisions on this point as follows: "It is to be observed of these conflicting decisions that the difference in result appears to arise rather from a difference of opinion as to the effect of the guarantee then from any disagreement as to the legal principle. The decisions which hold that a guarantee is a proper provision for the protection of the municipality and does not impose the expense of repairs upon the abutting proprietors seem to recognize three features of the guarantee before the courts as controlling, viz.: that the contractor was not required to guarantee his work against any other defects than those for which he might properly be held responsible; that responsibility for defects arising from causes for which he was not responsible, as from acts of the city or its licensees in opening the street, was not imposed upon the contract; and that the guarantee did not extend beyond such term of years as the pavement might naturally be expected to continue in good order. In some of the cases which have adopted the contrary view, the courts have relied upon the fact that the guarantee in question was in effect an agreement to keep the whole street in repair for a term of years, irrespective of the causes which might necessitate the repairs, or at least that it obligated the contractor to repair defects in the streets for which he was not responsible."

## ORGANIZATION FOR REFUSE COLLECTION.*

### Study of Operation and Efficiency of Existing Plan at Rochester and Recommended Organization of "Bureau of Sanitation."

At present the collection and disposal of garbage, ashes and rubbish in Rochester are functions of the Department of Public Works, the two latter being under the direct charge of the deputy commissioner, while the collection and disposal of garbage are in charge of a separate organization unit in the department. The investigators find that, from an operating standpoint, the existing organization gave poor executive efficiency resulting from decentralized control. The organization might prove effective in a small city but is not so for a large one. In a large city supervision must be made through reports of responsible subordinates, since it is impossible for any one man to personally supervise and direct all the activities of the department. Under the old organization too much work was loaded upon a few supervisory officers and these were inadequately provided with facilities for performing their duties. Too much responsibility for efficiency of the work lay with the foremen, and their influence was greatly diminished by the political influence of the discharged men. The report gives definite instances of such occurrences.

As illustrations of some of the effects of poor supervision, it is related that refuse receptacles are frequently allowed to remain on a street over night, after having been trucked out to the curb for collection but not having yet been emptied into the collecting wagon. In several instances, streets for several consecutive blocks were observed in this unsanitary condition over the week-end. The condition is invariably, and probably truly, attributed to the failure of teams to return for a final load. "Junking" is a favorite pastime of the rubbish collectors, both drivers and loaders sorting out all small materials of value as the contents of the receptacles are emptied. From three to five minutes are consumed in emptying a receptacle after it has been trucked to the curb; sometimes its contents are even emptied on the sidewalk in order that the sorting may be more thorough. The time lost in this way is of more importance than the revenue lost to the city. As a result of this practice, which is possible because of lax supervision, rubbish collections are poorly made and cost six times as much as ash collections.

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* Continued from page 7.

Another practice that should be prevented is the placing of rubbish with the ashes when the amount of the former is small. Largely because of this, approximately 30 per cent of all the rubbish produced in Rochester is hauled to the ash dumps, littering them up and causing them to become unsightly and unsanitary, increasing the cost of ash collection and dump operation, and depriving the city of considerable revenue obtainable from recoverable materials. In one district, where rubbish is collected altogether separate from ashes, the amount of rubbish in proportion to the amount of ashes collected is more than half again as great as for the city at large.

It is essential that supervision of the garbage collection be of the highest order, which requires that the supervisory officers visit each of their collectors several times during the course of the day.

Unequal distribution of work is also partly responsible for the unequal efficiency of the various units of the collection forces. In nine districts of Rochester, during 1917, the average number of loads of ashes collected per man per day in the several districts during the year varied from a maximum of 2.64 to a minimum of 1.53; and the amount of rubbish collected varied from a maximum of 1.038 tons per man per day to a minimum of 0.591.

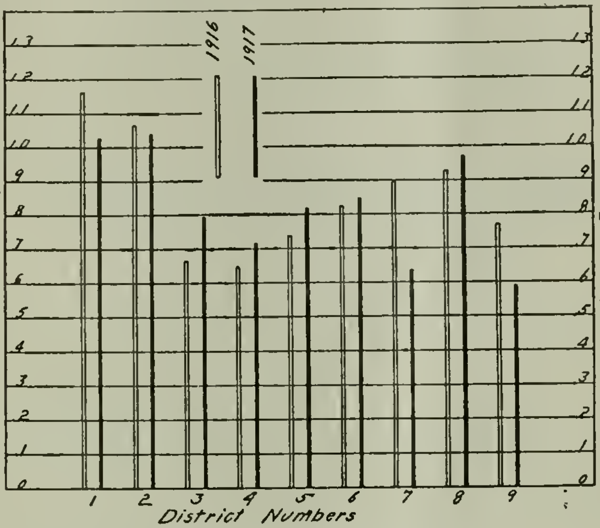
For a continuous week during 1917 a time study was made of ash collection, the result of which is shown in the accompanying table. Time of all laborers acting as foremen was excluded, in order to get only the actual time that was spent in the labor of trucking out ash receptacles, loading the contents onto the wagons, and returning the empty receptacles. The accuracy of the figures depends entirely on the degree of accuracy with which the receptacle canvass was made and the time sheets prepared. From observations made during the taking of the canvass and certain checks, such as duplication of a part of the canvass, it is believed that the results are substantially correct. This table shows that where a district is thickly populated, the number of receptacles is usually large in proportion and that where there are many factories and business places, the irregularity due to their presence is offset by the large number of receptacles per stop. It also shows that there is no district having low efficiency in collection work which cannot be matched by a district having similar physical characteristics and a standard of performance above the average. Further conclusions are:

1. The unit cost of rubbish collection is not a criterion of the ability of the collection forces.

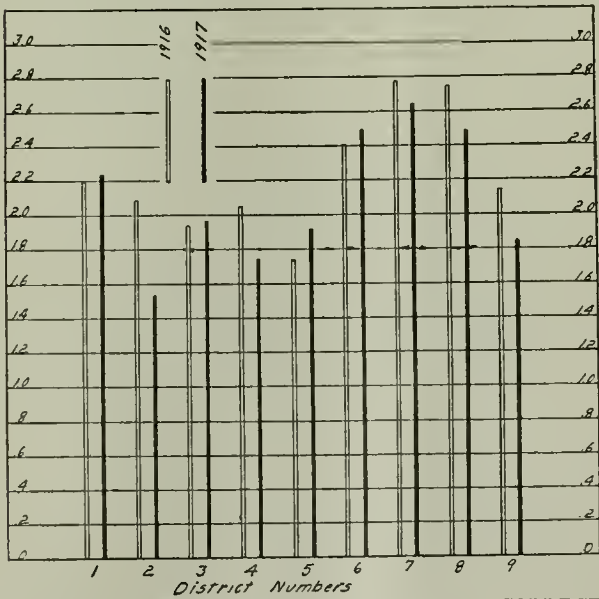
2. The unit cost of ash collection is a prettty good indication of the ability of the various district organizations to get things done.

3. The wide variation in efficiency between the labor forces of different districts evidently is due to the character of supervision and discipline maintained and not in any degree to physical differences in the work.

4. A more even division of work and a re-organization of the collection forces would make possible considerable



AVERAGE NUMBER OF TONS OF RUBBISH COLLECTED PER DAY PER MAN EMPLOYED.



AVERAGE NUMBER OF LOADS OF ASHES COLLECTED PER MAN PER DAY.

TIME STUDY OF ASH COLLECTION WORK.

| | Dist. 1 | Dist. 2 | Dist. 3 | Dist. 4 | Dist. 5 | Dist. 6 | Dist. 7 | Dist. 8 | Dist. 9 | Average |
|---|---|---|---|---|---|---|---|---|---|---|
| Gang—hours labor to complete collection | 96 | 80 | 92 | 96 | 114 | 90 | 80 | 133 | 100 | 95 |
| Man—hours labor to complete collection | 970 | 1,115 | 895 | 828 | 1,024 | 662 | 857 | 1,321 | 756 | 936 |
| Loads collected | 293 | 178 | 189 | 159 | 241 | 174 | 249 | 424 | 152 | 229 |
| No. of stops from which collections were made | 2,701 | 4,189 | 3,800 | 5,332 | 5,630 | 3,685 | 5,898 | 8,012 | 2,396 | 4,627 |
| Receptacles emptied | 11,126 | 9,742 | 7,107 | 10,929 | 12,236 | 11,949 | 12,582 | 15,622 | 5,678 | 10,752 |
| Stops per load | 9.22 | 23.5 | 20.1 | 33.5 | 23.4 | 21.2 | 23.7 | 18.9 | 15.8 | 20.2 |
| Receptacles per stop | 4.12 | 2.32 | 1.87 | 2.05 | 2.17 | 3.24 | 2.13 | 1.95 | 2.37 | 2.33 |
| Receptacles per load | 38.0 | 54.6 | 37.6 | 68.8 | 50.8 | 68.7 | 50.5 | 36.9 | 37.4 | 47.1 |
| Minutes per gang per load | 19.7 | 27.0 | 29.2 | 36.2 | 28.4 | 31.0 | 19.3 | 18.8 | 39.5 | 25.7 |
| Minutes per man per stop | 21.5 | 16.0 | 14.2 | 9.3 | 10.9 | 10.8 | 8.7 | 9.8 | 18.9 | 12.2 |
| Minutes per man per receptacle | 5.2 | 6.9 | 7.5 | 4.5 | 5.0 | 3.3 | 4.1 | 5.1 | 8.0 | 5.2 |

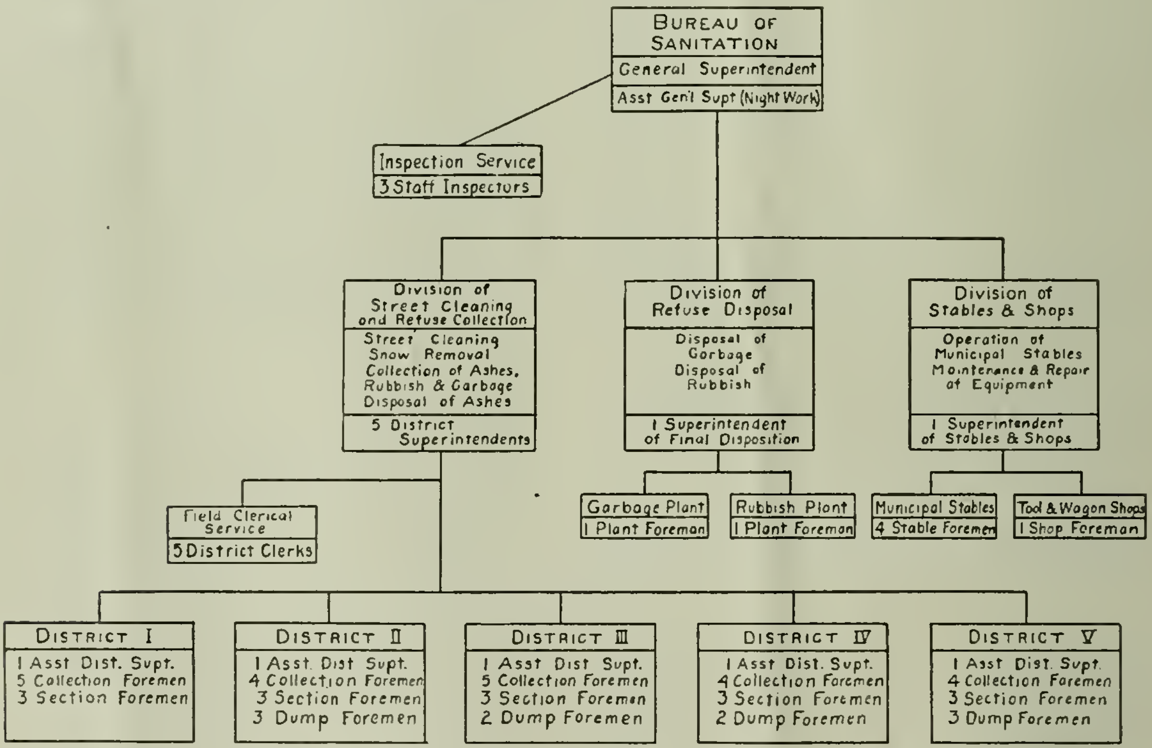
increase in results per man-day; or conversely, greater economy in man-power.

In developing a plan of organization, several factors were considered, the more important being:

1. The kind and number of functions involved.
2. The area, topography and geographical layout of the territory to be served, together with probable future growth.
3. Present and future population and density of population.
4. The standard of service required.
5. The work methods employed.
6. The class of labor available.

### ORGANIZATION RECOMMENDED.

It is believed that any plan, to be successful, must be based upon the establishment of a permanent force operating under proper conditions as to basis of employment, training and supervision. The plan proposed and which, we understand, is being carried out, is indicated by the accompanying chart of organization of the Bureau of Sanitation of the Department of Public Works.



PROPOSED ORGANIZATION OF A BUREAU OF SANITATION OF THE DEPARTMENT OF PUBLIC WORKS.

There are three general plans of organization which might be adopted for such service. First, the organization might be entirely functionalized, which would mean that one officer would be placed in charge of each kind of work and would be held responsible for all work of that kind done in the entire city. Second, the organization might be entirely geographical, under which plan all of the work of street cleaning and refuse collection would be carried on under the direction of a single officer in each of a number of small geographical divisions of the city. Third, some combination of the two plans mentioned might be adopted; that is, the city would be divided into several relatively large geographical units, each in charge of a single responsible officer; but below this single executive the work would be functionalized, that is, immediate supervision over the different kinds of work would be effected through functional foremen reporting directly to the district superintendent.

It was concluded that Rochester is too large a city for successful operation under the functional plan of organization and that the cost of supervision under such a plan would be unnecessarily high. Experience with the geographical plan in Rochester had indicated that it would not prove satisfactory, and it would require a large and expensive supervisory force to be effectively carried out. Study of the layout and other characteristics of the city led to the decision that for Rochester a 5-district plan could be worked out most satisfactorily, and this number of districts was recommended, with organization under the third plan.

The suggested organization of the proposed bureau of sanitation would include three divisions; a division of street cleaning and refuse collection, which would have as its functions the field work of street cleaning, snow removal, ash, rubbish and garbage collection, and the disposal of ashes; a division of stables and shops which would have as its functions the maintenance and repair of the street cleaning and refuse collection equipment and the maintenance and operation of municipal stables; and a division of refuse disposal, which would have as its functions the disposal of garbage and rubbish reclamation and disposal.

With the city owning all of its teams and equipment used in street cleaning and refuse collection, the maintenance of the horses and equipment and the repairs which would be necessary seem to be a work of sufficient magnitude to call for a separate division, the head of which would have the title of superintendent ranking with the district superintendents of the division of street cleaning and refuse collection.

The division of refuse disposal would be headed by a superintendent ranking with the district superintendents, who would be responsible for the operation of the garbage reduction plant and the rubbish incinerator. It is not believed, however, that supervision of ash dumps should rest with this division, since final disposition of the ashes is so closely connected with the field work of collection that the district superintendents of collection should be better able to supervise this work.

The report outlines as follows the suggested order of rank and the distribution of authority, sub-division of work and duties of the working forces:

THE WORKING FORCES.

1. General Superintendent: Executive or active head of the Bureau of Sanitation. Responsible to the commissioner of public works.

2. Assistant General Superintendent: Assistant to the general superintendent; in charge of all night work; executive head of the Bureau of Sanitation in the absence of the general superintendent. Responsible to the general superintendent.

(In addition to the general superintendent of the Bureau of Sanitation, it is believed necessary that there be an assistant general superintendent to assume charge of all night work, including street cleaning and snow removal, and to act as executive head of the bureau in the absence of the general superintendent. A more detailed discussion of the need for an assistant general superintendent will be found in this Bureau's report on the problem of street cleaning.)

3. Five District Superintendents (one in each of the five districts): In immediate charge of all day work, including street cleaning, snow removal, ash, rubbish and garbage collection, and ash disposal. Responsible to the general superintendent.

4. Five District Clerks (one in each of the five districts): In charge of all field records and reports, each under the direct supervision of a district superintendent, but with no direct authority over any of the force employed.

5. Five Assistant District Superintendents (one in each of the five districts): In charge of the collection of garbage; but on occasion assigned to other special duties, such as acting district superintendent in the latter's absence. Each responsible to his district superintendent.

6. Fifteen Section Foremen (three in each district): In immediate charge of all street cleaning, pick-up work, snow removal, crosswalk cleaning and gutter drainage. Each responsible to his district superintendent.

7. Twenty-two Collection Foremen (four in each of Districts II, IV and V, and five in each of Districts I and III): In immediate charge of the collection of ashes and rubbish. Each responsible to his district superintendent.

8. One Street Cleaning and Collection Foreman in Charlotte: In immediate charge of all street cleaning and ash and rubbish collection work. Responsible to the district superintendent in District V.

9. Ten Dump Foremen (one at each dump): In charge of the operation of the ash dumps, to keep records of loads hauled to their dumps. Each responsible to his district superintendent.

10. Drivers, street cleaners, flushers, patrol sweepers, pick-up men, roustabouts, truckers and loaders, dump laborers: The regular street cleaning and refuse collection labor force. Working under the immediate direction of foremen.

11. Emergency laborers: To supplement the regular street cleaning and refuse collection labor force as necessary. Working under the immediate direction of foremen.

OTHER RECOMMENDATIONS.

Among other questions considered are the permanency of employment of the force, which is considered to be very important. The enforcement of civil service rules in filling positions in the bureau, and the adoption of a system of merits and demerits and a conduct record for each employe might be developed similar to that carried out in the New York Department of Street Cleaning by Commissioner Fetherston.

To aid in what might be termed "administrative supervision" to assist in standardizing the movements and habits of the officers (who cannot be kept under direct supervision except in a limited degree), it is suggested that a day book or daily blotter be kept at each section station, dump office, stable, and district headquarters as well as at general headquarters. Every foreman and superintendent should be required to sign the blotter and note the time of arrival and of leaving each station. This blotter system was found both valuable and practicable in the New York Department of Street Cleaning.

Uniforms are considered desirable for several reasons which have already been detailed in Municipal Journal and Public Works. The color and type of uniform should be adapted to the work, it being suggested that white be used for street cleaners, khaki for members of the collection force, plant laborers, assistant foremen, etc., and olive green for the officers. In addition to the uniform, every member should be required to wear a badge, those worn by the officers indicating their rank, and those by the laborers bearing identification numbers. It is suggested that a school for recruits be established similar to the one conducted by the Department of Street Cleaning of New York City.

For emergency labor, required in summer for street cleaning and in winter for snow removal, preference should be given to men on the civil service elegibility list, and when that has been exhausted, recourse should be had to specially compiled emergency lists giving the names and addresses of men available for work on short notice.

# WATER WORKS ACCOUNTING AND BILLING.

### System and Methods Recently Adopted at Milwaukee—Accounts on Block System—Billing Machines—No Receipts Returned.

On June 1st, 1918, the water works Division of Collections of Milwaukee, put into operation a new system of handling accounts that is reported by Osw. J. Ronge, chief of the division, to be far superior to the old method. He describes the system as follows:

The city is divided into two general subdivisions, with Wisconsin street-Grand avenue as the dividing line. The entire portion of the city north of this line is divided into blocks, each block comprising one or more city squares and containing approximately 100 accounts. These blocks are numbered in parallel lines from east to west, with odd numbers only, 100 numbers being allowed to each of the parallel lines. The same system is employed for the portion of the city south of the dividing line, but even numbers are used.

The block numbers are permanent and do not change.

All consumers' accounts in each individual block are numbered consecutively from one up, beginning at a common starting point in each block.

For facility in handling the work at the office, the city is divided into nine equal sections, each beginning at the lake shore and radiating wedge shaped to the outskirts. One senior clerk-bookkeeper is assigned to each section, with complete charge of all accounts therein. The advantage of this arrangement is that it distributes the work equally among the senior clerk-bookkeepers, as each section contains part of the down-town or business district, part of the central and part of the outlying district.

All consumers' ledger cards were renumbered and set up in accordance with the plan outlined above. All inspectors of water meters route slips were renumbered and set up in route books to conform with ledger cards.

Meters are now read as set up in these route books. During the final months of quarters, when readings of accounts in route books are taken, instead of the inspectors of water meters being obliged to make abstracts from the books on quarterly reading slips, which in turn had to be delivered to the office and assorted and given to clerks in charge, they simply turn in their books and assessments are computed directly from field reports, avoiding a multitude of errors.

When one or more blocks have been computed, the senior clerk-bookkeeper can immediately proceed with the preparation of the assessment roll, instead of waiting until all readings were in and all accounts computed, as was necessary under the connection number plan.

Billing can be begun by clerks immediately after the first day's readings are in and accounts computed, instead of waiting until all readings have been taken and inspectors of water meters have reported at the office.

Under the new plan, when all readings have been taken and accounts computed and billed, bills are in the same rotation as ledger cards and route book accounts, and are immediately ready for delivery. All time required for assorting bills for delivery has been eliminated. The time required under the old system for inspectors of water meters to fill in the daily reading slips, detailed daily work report, billing, assorting bills, etc., is now put in on routes taking readings that they were formerly obliged to omit.

*Billing Machines.*—All billing at this office is now done by especially constructed machines. By these machines, present reading, previous reading, consumption and amount are printed on the bill, as well as the amount printed on stub. The amount is set in and printed on the bill, and the machine automatically shuttles over and prints the amount on the stub, without again setting in figures on the machine. Further, the machine accumulates the consumption and amounts.

These machines have proven very satisfactory for the following reasons:

Firstly: Bills can be more expeditiously filled in; in fact, increasing the output more than 100 per cent over billing by hand.

Secondly: A much neater and more ligible bill is produced than when written by hand. Where thirty-six men are writing bills, you have thirty-six different kinds of chirography, with a certain percentage always difficult to decipher by receiving tellers.

Thirdly: As the cubic feet are accumulated, it is unnecessary to again go over accounts to pick up the same for monthly reports to general office, eliminating that extra work.

Fourthly: As amounts are accumulated, all time for running bills on adding machines to check with assessment roll has been saved.

Fifthly: As amounts on bill and stub are printed from same type with but one setting on the machine, all errors between bill and stub, by transposition or otherwise, are eliminated, and all time for comparing bills and stubs is saved.

Sixthly: With upwards of 65,000 accounts, a very great saving of labor has been shown by these machines.

The above described section, block and account number system for handling consumers' accounts has now been in operation for one year, during which time it has exceeded all expectations and shown a tremendous elimination of unnecessary and duplication of work, in addition to showing a very substantial saving of labor, stationery and postage. Were we still operating under the old connection number system, an addition to the field force of at least two men would be necessary during the year 1919, amounting to an increase in the payroll of upwards of $2,000.

Notwithstanding the fact that the number of consumers is continually increasing, under the new plan the present field force will be ample to handle the work of the division during next year. The elimination of unnecessary and duplication of work will amount to several thousand dollars annually and the saving of labor, printing and postage after all deductions and offsets, to an equal amount annually. Moreover, it furnishes the proper control over field men.

The entire force, both office and field, are enthusiastic over the new system, as it greatly facilitates their work, and they claim that in every respect it is far superior to the old connection number system.

*Returning Receipts.*—The practice of returning receipts for mail remittances was discontinued during 1910. The following foot note was printed in red ink on quarterly water bills: "Unless requested, receipts will not be returned on mail remittances." Receipts had, since the establishment of the water works, always been promptly returned for all remittances received by mail ,and there was some doubt as to the manner in which the public would view this change. However, no difficulty has been encountered and no complaints received from consumers. On account of the other public service utilities having followed a similar plan for some time the adoption thereof by the water works was evidently not unexpected by the consumers.

This has reduced the cost for postage for that particular service upward of 75 per cent, showing a saving of better than $300 per annum, in addition to saving the time necessary for addressing and mailing.

## CHLORINATION IN WEST VIRGINIA.

### Public Water Supplies of That State Which Are So Treated—Results of Disinfection in Lowering Typhoid Rates.

Through the courtesy of Mayo Tolman, director and chief engineer of the Division of Sanitary Engineering of the Department of Health of West Virginia, and of E. S. Tisdale, assistant engineer of the division, we have received very complete information concerning the use and results of use of chlorine in connection with the public water supplies of West Virginia.

Commenting upon the experience had in general in that state, Mr. Tolman writes: "Liquid chlorine as a disinfectant for drinking water supplies has shown its efficiency to a very marked degree in West Virginia. In fact, the results obtained by its use as represented by the reduction of typhoid have been quite marvelous.

"Unfortunately, our vital statistics are so poorly kept and so inaccurate that no definite conclusions can be drawn, but I am under the impression that liquid chlorine as a water disinfectant does not make the so-called Mills-Reincke phenomenon so apparent as when filtration is adopted. This, however, is guess work at the best, but I believe that it would be profitable for communities that have accurate vital statistics to investigate this statement. It would appear from the data at hand that, instead of the deaths from all causes being reduced approximately in the ratio of four to one, the reduction does not much exceed two to one."

A few weeks ago we referred briefly to the probability that persons brought up on water containing typhoid germs acquire an immunity that is not possessed by those who have always drunk only the purest of water. This idea appears in Mr. Tolman's letter, in which he says: "It has been my experience that when liquid chlorine is used and the apparatus breaks down or is put out of commission for any reason and polluted water is allowed to enter the city mains, an epidemic of typhoid results and this epidemic is invariably more severe and more explosive in its violence than any outbreaks previous to the first use of the disinfectant. Chlorine seems to have a remarkable capacity for breaking the chain of natural immunity that develops in a community continually using a polluted supply. For example, for years Elkins used a polluted source of supply with no serious outbreaks of typhoid. To be sure, there was always a high tyhoid rate, but never what one would call an epidemic. In 1916 I introduced a chlorinating plant in that town and in the spring of 1918 this plant went out of commission. About two weeks after the break-down, Elkins experienced a very severe epidemic of typhoid, deaths resulting. (More details of this are given later on.) This has been my experience almost universally throughout the state, and consequently my attitude now is that no community should be dependent upon one chlorinator solely. Chlorine being a highly corrosive gas, it is quite remarkable that the apparatus handles it as long as it generally does. Sooner or later the machine must be taken out and cleaned and repaired, and the danger at such times is acute. If we had the laws, I would make it a hard and fast rule that no community should be dependent upon one chlorinator solely."

Concerning the matter of tastes and odors, Mr. Tolman says that, while several West Virginia towns are now experiencing trouble of this kind, he finds that wherever there are tastes and odors there are tarry or oily wastes present in the stream, although they may be in minute quantities only. He suggests that filtering the water through saw-dust before chlorinating it would probably eliminate this danger.

Instead of using large amounts of chlorine for disinfecting drinking water, he finds that if chlorine is introduced at several points—for example, one application in the raw water, another just before it goes into the filter, and a third in the clear water, the total dose can be decreased and kept within 0.3 part per million, "which has proven in this state to be an optimum."

**Use of Chlorine for West Virginia Water Supplies.**

| Town. | Population. 1910. | Population. 1918. | Source. | Chlorine plant Installed. | Has Treatment Been Continuous? | Filtration or Other Treatment. |
|---|---|---|---|---|---|---|
| Barboursville | 907 | 1,200 | Guyandotte river | Oct. 1918 | Yes | Filtration through crib in sand bar of river |
| Bluefield | 13,974 | 17,000 | Mountain springs | 1915 | Yes | .......... |
| Buckhannon | 2,225 | 4,000 | Buckhannon river | 1916 | Yes | Two 500,000-gal. Cont.-Jewell filters installed 1919 |
| Kenova | 992 | 1,200 | Big Sandy river | 1917 | Liquid chlorine & hypochlorite used | Lime & iron followed by sedimentation in reservoir |
| Clendennin | 815 | 1,500 | Elk river | 1916 | Failure to operate plant properly during flood caused fever outbreak, Feb. 1917 | .......... |
| Dunbar | 61 | 1,200 | Kanawha river | Summer, 1917 | Liquid chlorine or hypochlorite used continuously | Pressure filter |
| Elm Grove | 1,899 | 2,500 | Pleasant creek | 1918 | Yes | Mechanical filtration |
| Elkins | 5,260 | 7,000 | Tygarts valley | 1916 | Except for 2 mos. in spring of 1918 | Mech. filtration plant now being designed |
| Fairmont | 11,439 | 20,000 | Tygarts valley | 1916—Unsatisfactory<br>1918—Satisfactory plant installed | Continuous since Dec. 1918 | Storage in 6 million gallon reservoir |
| Gassaway | 1,086 | 1,200 | Elk river | 1917 | Except during high water Mar. 1918 | None |
| Grafton | 7,563 | 10,000 | Tygart valley | 1916—Unsatisfactory<br>1918—Satisfactory installation | Not until July, 1918 | None |
| Hinton | 3,656 | 5,200 | Greenbrier river | 1918 | Yes | Pressure filters—two 500,000-gal. units |
| Huntington | 41,515 | 54,500 | Ohio river | 1914 | Yes | 6 units—Cont.-Jewell mechanical filters |
| Kingwood | 800 | 1,200 | Indian Crk. | 1918 | Yes | None |
| Lewisburg | 803 | 1,100 | Greenbrier river | 1917 | Yes | None |
| Morgantown | 12,239 | 16,000 | Monongalia river | 1918 | Yes | Mechanical filtration |
| Parkersburg | 19,917 | 23,500 | Ohio river | 1917 | Yes | Smith system; filter beds in Ohio River |
| Petersburg | 500 | 1,200 | So. branch Potomac river | 1917 | Yes | None |
| Piedmont | 2,054 | 4,500 | Savage & Potomac river | Hypochlorite emergency plant May 1914 | No | None |
| Pratt | 306 | 450 | Kanawha river | 1917 | Yes | Small filter |
| Shepherdstown | 1,070 | 1,100 | Potomac river | Sept. 1918 | Yes | Slow sand filter and public water supply installed 1918 |
| Sistersville | 2,684 | 4,000 | Ohio river | 1917 | Yes | New mech. filter plant completed 1917—Chlorination installed then |
| St. Albans | 1,209 | 2,500 | Coal river | 1916 | Yes | None |
| Stealy Heights | 511 | 2,000 | West Fork river | 1917 | Yes | None |
| Thomas | 2,354 | 2,500 | Blackwater river | 1916 | No—plant unsatisfactory | None |
| Wellsburg | 4,189 | 5,000 | Ohio river | 1917 | No--plant removed | None |
| Wheeling | 42,817 | 56,000 | Ohio river | No. 1918 | Yes | None |
| Charleston | 27,703 | 45,000 | Elk river | 1916—Shifted from hypo to liquid chlorine | Yes | Mechanical filtration |
| Weston | 2,213 | 4,000 | West Fork river | 1916—Shifted from hypo to liquid chlorine | Yes | Mechanical filters |
| Martinsburg | 12,032 | 16,000 | Springs in limestone | Hypo treatment started 1915 | Yes | None |
| Clarksburg | 25,000 | 35,000 | West Fork river | Hypochlorite treatment | Yes | Mechanical filtration |
| Welch | 1,256 | 3,000 | Deep well | 1917 | No | None |
| Philippi | 1,038 | 1,500 | Tygarts Valley riv. | 1917 | No—machine not giving good service | None |
| Logan | 1,640 | 5,000 | Guyandotte river | 1917—Hypochlorite treatment | Yes | None |
| Ronceverte | 2,157 | 2,500 | Greenbrier river | 1917 | No | None |
| Williamson | 3,561 | 5,000 | Tug fork | Hypo treatment, 1912 | Yes | Rapid sand filter |
| Matewan | 588 | 1,000 | Tug fork | Hypochlorite treatment in 1916 | Yes | Pressure filter |
| Cons. Coal Co. Monongah | 2,084 | 4,000 | West fork | 1918 | Yes | None |
| W. Va. Coal & Coke Co. Norton | 150 | 1,200 | Tygart valley | 1918 | Yes | None |
| Black Betsey Con. Coal Co., Black Betsey | 350 | 500 | Kanawha riv. | 1918 | Yes | None |
| White Sulphur Springs | .... | .... | Springs | 1917 | Yes | ...... |
| Belington | 1,481 | 1,600 | Tygart valley | 1919 | .... | None |
| Richwood | 3,061 | 6,000 | Cherry river | 1919 | .... | None |
| Total population | 267,159 | 378,850 | | | | |

Most of the information given concerning the 43 chlorinated water supplies in West Virginia are shown herewith in tabulated form. Information concerning the prevalence of typhoid before and after chlorination, however, is given in the following running statement:

Buckhannon had a bad outbreak of typhoid in 1914, a chlorine plant was installed in 1916, and there has been practically no typhoid since that time.

In Clendennin, typhoid was endemic during 1915 and 1916, with thirty cases in the spring of 1917. With a chlorine plant operating successfully since 1917, there was no outbreak in 1918 or 1919.

In Dunbar there had been considerable typhoid, there being twenty-eight cases in June, 1917. A chlorine plant was installed that summer and there has been marked freedom from typhoid since that time.

In Elkins, typhoid was endemic during 1914 and 1915, and the chlorine plant was installed in 1916. Typhoid was notably absent from the city after this until March, 1918, when the chlorine plant went out of commission for two months on account of lack of gas. There resulted a serious outbreak, with 129 cases and 7 deaths during March, April and May. There has been practically no typhoid since that time.

Fairmont had much typhoid during 1917, with two epidemics in 1918, there being 28 cases in early spring and 91 cases in the late summer. In 1918 a satisfactory chlorine plant was installed and only three cases have been reported this year.

Gassaway had been a hot-bed of typhoid fever ever since the town started. A chlorine plant was installed in 1917. Its operation was interrupted by high water in March, 1918, following which there was an outbreak of 25 cases of typhoid. Since then up to date there have been practically no cases.

In Grafton typhoid was very prevalent. An unsatisfactory chlorinating plant was installed in 1916, but following a severe outbreak with 40 cases in May and June, 1918, a satisfactory plant was installed and there has been a marked reduction in typhoid cases.

St. Albans had an outbreak in 1916 of 34 cases and a chlorine plant was installed. Since then there has been no outbreak, although a scattered case appears now and then.

Thomas had an outbreak with 7 cases in 1916. A chlorine plant was installed resulting in immediate reduction of typhoid. The plant was not a mechanical success and after being dismantled no satisfactory machine was obtained in its place and the typhoid rate is again high.

Wellsburg, following 9 cases of fever in 1916, installed a chlorine plant in 1917. The combination of chlorine with bleach wastes from the paper mill imparted tastes and odors to the water and the chlorinator was removed a few months later, the people boiling their water now that the chlorinator is out of service.

Wheeling for thirty-three years had an average loss of 33 deaths per year from typhoid. For ten years ending 1915 the typhoid death rate was 165. In November, 1918, a chlorine plant was installed, and the same month the case rate dropped from 36 to 17 and declined during the succeeding months to 5, 2 and 1. Practically no fever has been reported to date in 1919.

Charleston had two bad epidemics due to by-passing unfiltered water to the city. In 1917 there were 329 cases and 19 deaths, and in 1918, 190 cases and 35 deaths. Using a very high chlorine dosage probably has been the salvation of the city this spring while a new filtration plant is being constructed. A dose of over one part per million has been applied much of the time.

Piedmont in May, 1914, had an epidemic with 144 cases in a population of 3,300. A hypochlorite emergency plant was installed that month but was discontinued December 1, with the result that there were 29 cases that month and 34 in the month following, although during the five previous months the number of cases had been 7, 4, 2, 1 and 0 respectively. Water treated with hypochlorite is being furnished to this town at present.

At the Black Betsy Consolidated Coal Company there was an outbreak among the miners in 1918 due to a bad water supply, but a chlorine plant was installed and since that time there has been no fever.

Concerning most of the other supplies which have been chlorinated, the statement is made by Mr. Tolman that typhoid was very prevalent but has been greatly reduced by the use of chlorine, although there are no records for comparison. In a number of towns, however, the plant was installed as a precaution rather than because there had been any considerable amount of typhoid fever.

## CONSTRUCTING CONCRETE PAVEMENTS.

### Standard Practice as Recommended by the Mississippi Valley Association of State Highway Departments—Materials and Construction.

A conference on recommended practice for rural concrete road construction was held in Chicago a few weeks ago, by the Mississippi Valley Association of State Highway Departments. As a basis for discussion, the conference used the practice recommended last year by the American Concrete Institute. The discussion resulted in an agreement upon certain points of difference between this association and the Concrete Institute, and upon amplification of and additions to the practice that it had recommended. Some of the more important of these are as follows:

#### MATERIALS.

Laboratory tests for fine aggregate to include colorimetric tests for organic impurities, sieve analysis, both tensile and compression tests of mortar, and volume of silt. Field tests to include grading with a nest of sieves Nos. 4, 8, 14, 28, 48, and 100; and volumetric test for silt by shaking with water in a graduated glass cylinder.

Fine aggregate to consist of natural sand, or a mixture of this with screenings from durable stone and free from dust, at least 50 per cent by volume to be sand; all passing a screen having 4 meshes per inch.

Coarse aggregate for one-course pavement or the base of two-course to consist of sound and durable pebbles or crushed stone, with French coefficient of wear of not less than seven, or of slag of suitable quality and uniformity; all to pass a 2½-inch screen, be graded with reasonable uniformity, and at least 95% be retained on a ¼-inch screen. For the wearing course of a two-course pavement, the requirements to be the same, except that all should pass a 1-inch screen.

For a one-course road, the proportions to be 1:2:4, if machine-finished, and 1:2:3½ if hand-finished. For a two-course road, 1:2:4 for the lower course, and 1:2:3½ for the wearing course.

Extreme care to be used in amount of water applied, and "slump" test be used as follows: Fill 6 x 12-inch cylinder with concrete, tamped, as mixed for use, and immediately remove cylinder; if pavement is to be finished by hand, the concrete cylinder should not slump more than 6 inches, nor more than 2 inches if to be machine-finished.

### DESIGN.

The minimum thickness should be 7 inches at the sides, 7 inches in the centre of a single-track road, and 8 inches at the centre of a two-track road up to 20 feet wide.

Width of road to be not less than 18 feet, or 9 feet if a single-track road *must* be built. No widths between 10 and 16 feet to be used. Total width, including shoulders, to be at least 8 feet more than pavement width, and width of grade to be traveled, not less than 24 feet.

Crown to total 1 inch for two-track road not more than 20 feet wide, ½-inch for single-track, unless latter have one edge in centre line of road, when continuous slope of one inch all in one direction.

No curve to have radius on centre line of less than 200 feet. On all turns, the centre line of the road to be marked by a white strip 8 inches wide. Unless drainage conditions prevent, grade of centre line at curves to be maintained where pavement is superelevated, and crown of surface to be flat.

In middle west, grade should not exceed 6 to 8 per cent under ordinary circumstances. On steep grades vertical curves should be sufficiently long to give an unobstructed view of at least 250 feet.

Culverts and bridges to be of reinforced concrete built in place. Up to 12 feet span, clear width should be not less than full width of road grade as constructed; over 12 feet, clear width to be at least 20 feet, or 2 feet more than pavement width; sidewalks to be in addition to this width where they are built.

### SUBGRADE.

If possible, subgrade to be not trenched out, but kept higher than berms, so as to drain directly to side ditches. Subgrade to be rolled with macadam type of roller of 10 tons or more. If rolling causes waves, stop at once and investigate for soft material; in clays, waves probably due to moisture, which should be dried out or replaced with suitable material. Depressions that develop under rolling to be filled with suitable material. Sandy soils require less rolling than others.

Rough-grade very close to intended cross-section and to full width of shoulders. Avoid shallow filling or filling narrow, deep ruts without plowing. Finish subgrade to proper cross-section, using template, just ahead of concrete. If aggregates are deposited on subgrade, bring this to true cross-section in sections not more than 600 feet long immediately before aggregates are deposited, and keep roller in constant operation while they are being delivered, filling and tamping any ruts formed. Hauling over finished subgrade to be avoided as much as possible.

### EQUIPMENT.

The use of industrial railway is recommended. The mixer should be of standard paving type, having capacity of at least a two-bag batch; should have boom and bucket or other device for delivering concrete of proper consistency, automatic timing device and one for measuring amount of water per batch. For supplying water, use duplicate pumping machinery, booster pumps on long pipe lines, unions on pipe lines at intervals of not more than 1,000 feet, and tees at intervals of not more than 100 feet.

### CONSTRUCTION.

Mixing to continue at least one minute at not less than 12 r. p. m. All materials to be accurately measured in receptacles of such size that minimum number of units when struck off level will give proper quantity for batch.

Steel side forms to be used, using straight-edge to insure horizontal and vertical alignment.

Depositing, spreading and finishing concrete to be as nearly continuous as possible for full width and thickness of pavement. If delay is necessary, sufficient to permit concrete to take initial set, suitable header to be placed at right angles to road and concrete finished against this. No device or method for transporting concrete from mixer to place on subgrade to be used which tends to produce segregation of materials that later operations will not completely eliminate.

Work should close by date when temperature normally is materially below freezing point. If continued beyond this, precautions to be taken that will absolutely insure concrete against freezing for at least 7 days after placing.

Expansion joints to be used only in specific cases, such as junctions between pavement and other fixed objects When used, to consist of either high-grade wool felt or a fibrous material combined with a coal tar or asphalt compound; not more than 8% by weight to be mineral matter, nor more than 25% fibre. Contraction joints not to be used. Construction joint to be made whenever mixing is stopped for more than an hour. Reinforcement is of questionable value for pavement up to 18 feet width, with good foundation; but reinforcement, mainly in a transverse direction, may be used to advantage for wider pavement, especially if foundation is not thoroughly satisfactory. Use wire mesh or separate bar reinforcement, not less than 40 lbs. per 100 square feet, proportion of transverse to longitudinal steel not less than 3 to 1; place not less than 2 inches from finished surface, lap at least 4 inches longitudinally and 12 inches transversely.

When the mixture used is relatively dry, as is necessary to secure maximum strength, mechanical strikers and tampers should be used, so constructed and operated as to strike off and thoroughly tamp the concrete and be operated repeatedly over the same area, and leave the finished slab true to grade, crown and surface and absolutely free from porous places.

If a mechanical finisher is not used, and the consistency of the concrete is as above described, the concrete should be thoroughly tamped by means of a tamper operated vigorously by one or two men at each end on opposite sides of the roadway, so consolidating the concrete as to close all voids; this to be followed by a strike board and the pavement left as after machine finishing, and finally finished with a belt.

If medium consistency is used, spread, agitate and tamp the concrete, so as to positively insure avoidance of stone pockets or porous places, strike off, and roll with a light hand roller so as to remove surplus water and leave the surface true to grade and crown. Then finish with a belt.

As soon after finishing as it can be done without marring the surface, cover the concrete with canvas. As soon as it is sufficiently hard, if grade and other conditions permit, build longitudinal and transverse dikes and fill them with water covering the concrete 2 inches deep, keeping water on for at least 14 days. Where ponding method of curing is impracticable, cover the concrete with at least 2 inches of earth and keep it moist for at least 14 days, wetting it at intervals of not more than 12 hours.

Traffic should not be permitted to use the pavement in less than 21 days, nor less than 40 days if the curing conditions were unfavorable, nor for at least 3 days after removal of water or earth covering, nor until all dike or earth coverings have been completely removed.

Inspectors should have practical experience, knowledge of specifications and construction, absolute integrity, quick decision, sound judgment, forceful personality, common sense, ability to command the respect of the contractor, broad perspective, and ability to distinguish between essentials and non-essentials. The pay should be sufficient to obtain such men.

# THE MUNICIPAL INDEX

## In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

**It is our purpose to give in the second issue of each month a list of all articles or any length or importance which have appeared in all the American periodicals and the leading ones published in other countries, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on muncipal matters. In further issues of the paper, the price given is forere an article is continued in two or three each of said issues. In addition to the titles where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its given, and the name of the author when contents is added. The length also is it is a contributed article.**

## ROADS AND STREETS.

**Bituminous Roads:**

Hot Mix Asphalt Pavements. Utilization of existing pavements as foundation; mineral aggregates; types of hot mix pavements. From paper before Canadian Good Roads Congress, by F. P. Smith, N. Y. C. 4,000 words. Engineering and Contracting, June 4. 15 cts.

Operation Costs of Municipal Asphalt Plant. Portland, Ore., effects large saving over contract methods; plant pays for its cost three times in seven months. 1,200 words. Engineering News-Record, June 19. 20 cts.

How a Contractor Equipped His Asphalt Plant to Dispense with Two Men and Lower Cost of Asphalt. By M. R. Butler, Waukesha, Wis. 1 ill., 300 words. Municipal and County Engineering, June. 25 cts.

Bituminous Macadam. Preparation of foundation; laying first and second course; condensed rules for successful construction of bituminous macadam. From paper at Canadian Good Roads Congress, by A. W. Dean, chief engr., Massachusetts Highway Commission. 1,500 words. Engineering and Contracting, June 4. 15 cts. 1,800 words. Municipal and County Engineering, June. 25 cts.

Hot Mix Bituminous Pavements. Editorial discussion of the deserved popularity of this pavement and its possible use as "the pavement of the future" for heavily traveled roads. 1,000 words. Good Roads, June 7. 10 cts.

**Concrete:**

Specifying Dry Concrete for Road Surfaces. Should be stipulated only at places at which the surrounding conditions can be anticipated; editorial discussion. 600 words. Engineering World, June 1. 15 cts.

Suggestions for Concrete Pavement Construction. Detail plans of strike boards, joint boards, roller, belt, floats and other appliances used; various procedures of construction; features that should receive special attention of inspectors. 2 ills., 2,000 words. Municipal Journal and Public Works, June 14. 10 cts.

Suggestions for Concrete Pavement Construction. Conclusion of article begun in June 14th issue; belt finishing and curing pavements and general precautions. 1 ill., 900 words. Municipal Journal and Public Works, June 28. 10 cts.

Stresses in Concrete Roads. Experiments made by Bureau of Public Roads possibly explain reasons for many cases of cracking and failure. 1,000 words. Municipal Journal and Public Works, June 28. 10 cts.

Cracks in Concrete Roads. Editorial discussion of cause or causes, with reference to experiments made by the Bureau of Public Roads. 200 words. Municipal Journal and Public Works, June 28. 10 cts.

Concrete in Road Construction, Culverts and Bridges. Fine aggregate should be tested for organic impurities, gradation (sieve analysis), mortar strength and volume of silt or loam; field tests of fine aggregate; Deval abrasion test. Paper before Canadian Good Roads Congress, by H. Eltinge Breed, consulting engr., N. Y. C. 3,000 words. Good Roads, June 21. 10 cts.

**Stone Block:**

Design and Construction of Modern Granite Block Pavements with Special Reference to Practice in Borough of Manhattan. Types of granite pavement; advantages; dimension of blocks; filling joints; preparation and use of mastic; Durax pavement. By C. M. Pinckney, chief engr., Dept. of Public Works, Borough of Manhattan, N. Y. C. 11 ills., 3,200 words. Municipal and County Engineering, June. 25 cts.

How Albany, N. Y., Saved Over $360,000 in Using Re-dressed Granite Paving Blocks. Cost data. By F. R. Lanagan, city engr., Albany. 1 ill., 900 words. Municipal and County Engineering, June. 25 cts.

**Other Kinds:**

Macadam Roads. Helped win the war; most used and most abused of any form of highway improvement. Paper before Canadian Good Roads Congress, by A. P. Sandles, secretary, National Crushed Stone Ass'n, Columbus, O. 3,300 words. Canadian Engineer, June 12. 15 cts.

Surface Treatment of Gravel Roads with Refined Tar. Tars used for this purpose actually penetrate into the gravel, forming crust over the surface, that has considerable strength; roads should not be treated immediately after construction. By P. P. Sharples. 1,200 words. Good Roads, June 7. 10 cts.

Use of Calcium Chloride as Dust Preventive on Gravel Roads. Excellent results obtained by Connecticut Highway Commission; methods employed described by W. Leroy Ulrich, supt. of repairs, in Public Roads, from which this article is abstracted. 1,000 words. Engineering and Contracting, June 4. 15 cts.

Road Surfacing with Sand Clay from Salt Flats. Abstracts from article in Public Roads by R. H. Phillips, engr. of Aransas county, Texas, on methods of using this material and results. 1,800 words. Engineering and Contracting, June 4. 15 cts.

Methods of Constructing Roads Through Sandhill Regions. Abstract of paper before Nebraska Road Institute, by Paul E. Brown. 800 words. Engineering and Contracting, June 4. 15 cts.

Is Experimenting with New Designs of Pavement Justifiable? Editorial comment on waste of public money in repeating experiments or experimenting on too large a scale. 800 words. Engineering and Contracting, June 4. 15 cts.

The Pavement of the Future. Some one type may be selected for heavily-traveled roads; requisites of the ideal pavement as listed in Blanchard's "American Highway Engineers' Handbook." By L. E. Addis. 2,300 words. Good Roads, June 7. 10 cts.

**Organization and Finance.**

Federal Aid Road Work. Roads having combined mileage of 750.87, covered by 124 projects, approved for federal aid during May. 300 words. Municipal Journal and Public Works, June 14. 10 cts.

Views of Secretary Houston Regarding Creation of Federal Highway Commission. Reply to a city chamber of commerce requesting his views on subject. 2,200 words. Engineering and Contracting, June 4. 15 cts.

Secretary Houston's Opposition to a Federal Highway Commission. Editorial discussion of the Secretary's statement, given in full in this issue; arguments weak without exception. 800 words. Engineering and Contracting, June 4. 15 cts.

Illinois State Highway Department. Enlargement and reorganization found necessary because of enormous amount of highway construction to be begun. 150 words. Municipal Journal and Public Works, June 28. 10 cts.

Methods of Financing Highway Improvements. Excellent summary of various methods used in this country, embodied in committee report to American Road Builders' Ass'n, by J. E. Pennybacker, chief of Management, U. S. Bureau of Public Roads. 2,000 words. Engineering and Contracting, June 4. 15 cts.

**Contract and Force Account.**

Large Construction Companies Shun Road Work. Politics, narrow business practices and petty contract restrictions are objectionable to construction managers of large affairs. By C. S. Hill, assoc. editor. 2,200 words. Engineering News-Record, June 12. 20 cts.

Economic Status of Guarantees for Pavements on Roads and Streets. Three types of guarantees; engineer responsible to community. Committee report of American Road Builders' Ass'n. 2,500 words. Canadian Engineer, June 12. 15 cts.

Experience of the New York Commission of Highways in Doing Its Own Construction Work on Unfinished Contracts. 800 words. Municipal and County Engineering, June. 25 cts.

Force Account Work by New York State Highway Department. Interesting details regarding work on 67.89 miles of highway, carried on during 1918 by forces of the N. Y. state highway commissioner, given by E. A. Bonney, supervising engr. in charge of the work. 600 words. Engineering and Contracting June 4. 15 cts.

Force Account Work in New York State. Review of results secured by carrying out with highway department forces contracts abandoned by defaulting contractors. 1,000 words. Good Roads, June 28. 10 cts.

Road Machinery. American officials must face high wages for several years, hence need for labor-saving machinery; selection of material should be based upon character of work, specification requirements, portability of plant, transportation facilities, etc. Paper before Canadian Good Roads Congress, by A. H. Blanchard, consulting engr., N. Y. C. 3,000 words. Engineering and Contracting, June 4. 15 cts. 3,500 words. Municipal and County Engineering, June. 25 cts. 3,000 words. Good Roads, June 7. 10 cts.

**Miscellaneous:**

Practical Advice to Road Superintendents and Municipal Councils. Preparing the plan; carrying out the work. By A. Fraser, ass't chief engr., dept. of highways, Quebec. Paper before Canadian Good Roads. 3,300 words. Canadian Engineer, June 12. 15 cts.

Highway Requirements for 20th Century Transportation, with Special Reference to New Jersey Practice. Traffic uncertainties; alignment, grades and width; bridges and railroad grade crossings. By Wm. G. Thompson, state highway engr., Trenton. 2,000 words. Municipal and County Engineering, June. 25 cts.

Road Building in Quebec. Will not end until at least 40,000 miles have been improved; what French and English genius have jointly accomplished in highway work. By Sir Lomer Gouin, Premier of Quebec Province. 1,000 words. Canadian Engineer, June 5. 15 cts.

Good Roads and Agriculture. Roads provide vital link between farm and market; provincial government assistance. Address of welcome to the Canadian Good Roads Congress, by Hon. G. S. Henry, Minister of Agriculture, Province of Ontario. 1,500 words. Canadian Engineer, June 5. 15 cts.

Highway Design and Construction Papers Read Before Canadian Road Congress. Design and Construction of Hot-Mix Asphalt Pavements, by F. P. Smith, Dow & Smith, N. Y. C.; Testing Aggregates for Concrete Roads, by H. Eltinge Breed, N. Y. C. Factors Influencing the Selection of Road Plant, by A. H. Blanchard, N. Y. C. 5,000 words. Engineering News-Record, June 5. 20 cts.

Beautifying Highways. Vitally important; planting trees, shrubbery and flowers calls for only small expenditure. By J. A. Hazlewood, chairman, Wisconsin Highway Commission. 2,500 words. Good Roads, June 21. 10 cts.

Yielding Barriers Close Roads at Drawbridges. Impact of vehicles absorbed by traveling gate to stop motor trucks, and by cables to stop automobiles. 2 ills., 1,500 words. Engineering News-Record, June 12. 20 cts.

White Bricks Mark "Danger Lines" on Pavement. Employed by United Railroads of San Francisco where street cars round loops. 1 ill., 500 words. Engineering and Contracting, June 4. 15 cts.

Location of Sub-surface Pipe Lines to Conserve Street Pavements. Beginning now in unpaved areas; placing gas mains under sidewalks. By H. M. Adams, ass't engr., Borough of Bronx, N. Y. C. 1,400 words. Municipal and County Engineering, June. 25 cts.

Winter Roads. Problem of snow removal important; rolling not always satisfactory; snow fences effective; equipment used in Outremont. Paper before the Canadian Good Roads Congress, by A. Lalonde, ass't engr., Outremont, P. Q. 1,500 words. Canadian Engineer, June 5. 15 cts.

Opening and Restoring Pavements. Report of National Highway Traffic Association Committee. 900 words. Good Roads, June 28. 10 cts.

## SEWERAGE AND SANITATION.

Some Unusual Sewerage Problems and How They Were Solved at Ocean Beach, N. Y. Influence of ground water on design; construction of Imhoff tank; locating leaks and grouting under pressure. By A. J. Provost, Jr., consulting engr., N. Y. C. 6 ills., 3,000 words. Municipal and County Engineering, June. 25 cts.

Moore Park Drainage System, Toronto. Construction commenced in 1917 and completed in February, 1919. Information and drawings furnished by the contractor's engineer, H. F. Barker. 4 ills., 1,000 words. Canadian Engineer, June 5. 15 cts.

Some Broader Aspects of Rain Intensities in Relation to Storm Sewer Design. Relation of thunderstorms to excessive rain intensities; results of investigations by writer and conclusions thus far reached. By R. E. Horton, hydraulic engr., Albany, N. Y. 5 ills., 4,500 words. Municipal and County Engineering, June. 25 cts.

Chicago's Relief Sewers. Method of locating sewers; alternate plans being considered; building intercepting sewers. By C. D. Hill, engr. for construction division, board of local improvements, Chicago. 3 maps, 4,000 words. Engineering World, June 1. 15 cts.

Chicago's Standard of Sewer Construction. Reasons for Chicago's superiority in sewer construction; some factors which make for low maintenance cost. By C. D. Hill, engr. of construction division, board of local improvements, Chicago. 2,700 words. Engineering World, June 15. 15 cts.

Mosquito Control. Methods developed at army camps and by progressive communities. By W. D. Pierce, Bureau of Entomology, U. S. Department of Agriculture. 4 ills., 2,600 words. American City, June. 35 cts.

Clean Catch-Basins for Akron. By H. S. Morse, director of public service, Akron. 500 words. American City, June. 35 cts.

Trade-Waste Treatment Studies in Wisconsin. Wide range of investigations made to help lessen water pollution; treatment methods; test plant at Milwaukee. By E. J. Tully, state sanitary engr., Madison, Wis. 1,300 words. Engineering News-Record, June 12. 20 cts.

## WATER SUPPLY.

**A. W. W. A. Convention.**

American Waterworks Association. 39th annual convention in Buffalo had record attendance. 2,000 words. Canadian Engineer, June 19. 15 cts.

American Waterworks Association. Remarkable history of organization from small beginning of 20 members in 1881, to present importance and influence. 16 ills., 7,000 words. Fire and Water Engineering, June 4. 15 cts.

The Local Sections. Historical review of the various sections so far formed by members of American Water Works Association. 16 ills., 5,000 words. Fire and Water Engineering, June 4. 15 cts.

American Waterworks Convention. Doings of the 39th convention of the association; business transacted, reports of committees, paper and discussions, and "round table" and "question box" exchanges of experiences. 4,000 words. June 21. 4,200 words, June 28. Municipal Journal and Public Works. 10 cts.

The American Water Works Association. Editorial comment on retarded growth of membership and official measures proposed for meeting the situation. 1,000 words. Engineering News-Record, June 19. 20 cts.

Progress and Problems in the Field of City Water Supply. Abstracts of papers before the American Water Works Association at Buffalo. The "Uniflow" Pumping Engine," by D. A. Decrow, chief engr., Worthing Pump & Machinery Co., Harrison, N. J.; Advance in Chlorination and its Effect on Typhoid Fever, by John Kienle, sanitary engr., Electro-Bleaching Gas Co., N. Y. C.; Effect of the War Upon Water-Works Revenues and Expenses, by Leonard Metcalf, consulting engr., Boston, Mass.; Reduction of Water Consumption by Pitometer and Inspection, by Geo. C. Andrews, water commissioner, Buffalo, N. Y.; Need for Standardization of Flanges for Light Cast-Iron Pipe, by John Knickerbocker, president of the Eddy Valve Co., Waterford, N. Y. 3 ills., 2 tables, 5,000 words. Engineering News-Record, June 19. 20 cts.

**Pumping:**

Design of Motor-Driven Centrifugal Pumps. Typical characteristic curves for different types under identical conditions; non-overloading pump shows maximum efficiency when motor is under maximum load; induction motor designed under full load conditions is most economical drive. By A. T. Clark, ass't engr., Hydro-Electric Power Commission of Ontario. 5 ills., 1,700 words. Canadian Engineer, June 19. 15 cts.

Louisville's New Pumping Station. To house latest increase to pumping plant; thirty million gallon vertical, triple flywheel pump; contractor's methods and plant used in sinking caisson and erecting building. 8 ills., 3,500 words. Municipal Journal and Public Works, June 7. 10 cts.

Pumping Station at Aylmer, Ont. Description of 4-in., 2-stage, motor-driven domestic pump and 8-in. 3-stage gasoline-engine-driven pump; average cost of pumping and previous average cost. By H. L. Shepherd, ass't engr., Hydro-Electric Power Commission of Ontario. 2 ills., 1,000 words. Canadian Engineer, June 5. 15 cts.

The "Uniflow" Pumping Engine. Outstanding features are simplicity of construction, low cost of production, high duty or economy in use of steam. Paper before American Water Works Ass'n, by D. A. DeCrow. 2 ills., 1,500 words. Canadian Engineer, June 19. 15 cts.

Helical Gears Solve Cornwall's Pumping Problem. High speed single-stage centrifugal pumps are driven by low speed hydraulic turbines, with pumping efficiency of 73% including gear loss; direct drive would have required 14 stages, causing sacrifice of present efficiency. By R. N. Austin, gen. mgr., Turbine Equipment Co., Ltd., Toronto. 5 ills., 2,500 words. Canadian Engineer, June 5. 15 cts.

New Coal-Handling Plants for Philadelphia Water Works. General and detail designs of three systems supplying a total of 16 boilers with a total boiler capacity of 7,400 h. p.; costs reduced as compared with old methods. By H. R. Cady, Bureau of Water, Philadelphia. 3 ills., 1,500 words. Engineering News-Record, June 5, 20 cts.

Steam Turbine-Driven Centrifugal Pumps. Advantages for city water supply; superiority found in its economic advantages very useful for small stations. 3 ills., 1,300 words. Fire and Water Engineering, June 4. 15 cts.

Centrifugal Pumps at the Chicago Water Works Plants. Electric power more satisfactory than steam; two 40,000,000-gallon pumps with 1,100-h. p. motors being installed. 1,000 words. Engineering News-Record, June 5. 20 cts.

Pumping Plant at Sault Ste. Marie, Ont. Water drawn from power canal, gravitates to pumping station and passes through two Jennings band screens, which move slowly and automatically discharge screenings into hoppers. By R. O. Wynne-Roberts, consulting egr., Toronto. 1 ill., 700 words. Canadian Engineer, June 5. 15 cts.

**Meters and Waste:**

Water Meter Data. Information furnished by nearly 400 waterworks superintendents; location, reading, testing and maintaining of meters; cost of meter service. 800 words, 13½ pages tables. Municipal Journal and Public Works, June 7. 10 cts.

Reduction of Water Consumption by Means of Pitometer Survey and Constant Inspection. Brief description of pitometer survey; determining consumption by sub-divisions. Excerpts from paper before American Water Works Ass'n, by Geo. C. Andrews, water commissioner, Buffalo. 3,000 words. Canadian Engineer, June 19. 15 cts.

Why Meter? Reasons for completely metering municipal water supplies. 2 ills., 800 words. American City, June. 35 cts.

Metering and Water Consumption. Effect of meters on amount of water consumed by community; methods of controlling water waste; adoption of sewerage increases water consumption. By H. P. T. Matte, chief sanitary engr., Illinois State Department of Public Health. 1 ill., 2,000 words. Fire and Water Engineering, June 11. 15 cts.

The Lanham Manograph. A recording pitot tube meter; its use in measuring flow of water through mains of distributing systems, discharge mains of pumps, and all forms of conduits carrying pressure. 1 ill., 800 words. Fire and Water Engineering, June 4. 15 cts.

Universal Meterage. Some interesting replies to inquiry on subject; remarkable unanimity of opinion in favor of system; all sections of country represented. 2,500 words. Fire and Water Engineering, June 4. 15 cts.

The Meter Department. Methods for its efficient operation; policy of advising consumer on water works matters advocated; repairing and testing meters; frequency of testing; overstating an important question. By H. M. Ely, supt. of the Inter-State Water Co., Danville, Ill. 2 ills., 1,400 words. Fire and Water Engineering, June 4. 15 cts.

Reduction of Water Consumption by Means of Pitometer Survey and Constant Inspection at Buffalo, N. Y. By Geo. C. Andrews, water commissioner, Buffalo. 4,000 words. Municipal and County Engineering, June. 25 cts.

Water-Waste Education by Bulletins. Issued periodically by water department and circulated particularly among less well informed consumers. 500 words. Engineering News-Record, June 5. 20 cts.

Water-Meter Practice and Testing at Buffalo, N. Y. Special testing bench for large meters; cubic-foot pail for skeptical householders; non-freeze settings. By C. L. Lund, hydraulic engr. in charge of Buffalo meter shop. 1 ill., 1,300 words. Engineering News-Record, June 5. 20 cts.

Women Water-Waste Inspectors at Baltimore, Md. Men replaced with satisfactory results; women under direction of pitometer engineer paid $2.76 a day. By W. E. Lee, water engr., Baltimore. 3 ills., 600 words. Engineering News-Record, June 5. 20 cts.

**Purification:**

Disinfection of Water Supplies. Data concerning use of chlorine for public water supplies; incompleteness of typhoid statistics; causes of typhoid other than water. 1 table, 1 chart, 2,000 words. Municipal Journal and Public Works, June 14. 10 cts.

Disinfection of Water Supplies. Opinions of its value by waterworks officials in all sections of country; used alone as sole guard against typhoid, or in connection with filtration as additional safeguard. 1,200 words. Municipal Journal and Public Works, June 7. 10 cts.

Progress of Water Disinfection in Maryland. Need shown by survey by State Health Department; general description of plants and of results of chlorination. By R. B. Morse and H. R. Hall, chief engr., and ass't chief engr., respectively, of Maryland Department of Health. 3,200 words. Municipal Journal and Public Works, June 7. 10 cts.

Chlorination in Michigan. Applied to 90% of the water of public supplies; comments by state sanitary engineer on its uses and effects. 2,300 words. Municipal Journal and Public Works, June 7. 10 cts.

Is the Chlorination of Water Supplies Worth While? Typhoid fever morbidity rates give the answer; filtration and chlorination both essential. 1,200 words. American City, June. 35 cts.

Buffalo Water Supply, with Special Reference to the Filtration Problem. Chlorinating apparatus; standards of safety: suggested filter site. By H. F. Wagner, chemist, Bureau of Water, Buffalo. Paper before the American Water Works Ass'n. 3,000 words. Canadian Engineer, June 19. 15 cts.

Design of New Filters Influenced by Experience Gained from the Operation of Original Filters at the Minneapolis Plant. By L. I. Birdsall, supt. of purification division, Minneapolis Water Dept. 2,000 words. Municipal and County Engineering, June. 25 cts.

Testing Stations for Determining Critical Factors for Water Purification Plant Design. Excerpts from paper before the Illinois section of American Water Works Ass'n, by W. T. M'Clenahan and R. S. Rankin, ass't engrs., Pearse & Greeley, Chicago. 2,500 words. Canadian Engineer, June 5. 15 cts.

Combined Aerator and Mixer for Colloidal Water. Odor, color, taste and turbidity in underground water from cavernous limestone make treatment difficult. 4 ills., 1,000 words. Engineering News-Record, June 19. 20 cts.

The Numerical Interpretation of Bacteriological Tests. Theory of probabilities applied to sanitary engineering, with particular reference to results obtained in studies of water and sewage. By M. F. Stein, civil engr., Chicago, Ill. 5 ills., 3,500 words. Engineering News-Record, June 5. 20 cts.

Softening a Municipal Water Supply for Domestic Use. Hinsdale, Ill., has five years of successful treatment to its credit. By H. H. Bristol, supt. of waterworks, Hinsdale. 1 ill., 300 words. American City, June. 35 cts.

**Typhoid Prevention:**

Eternal Vigilance the Price of Freedom from Water-Borne Typhoid. Epidemic at Herkimer, N. Y., a warning. By T. Horton, chief engr., N. Y. State Department of Health. American City, June. 35 cts.

Maintaining Small Watersheds. Reference to report of city engineer of Little Falls, N. Y., John E. Foote, in which he described work on watersheds of several sources of supply. 200 words. Municipal Journal and Public Works, June 7. 10 cts.

Supervision of the Public Water Supplies of New York State. Activities under public health law; scoring and grouping water supplies; typhoid death rate greatly reduced. By T. Horton, chief engr., and E. S. Chase, ass't engr., engrg. division, N. Y. State Department of Health. 1,700 words. American City, June. 35 cts.

Protection and Immunity from Typhoid. Editorial discussion of theory that by minimizing danger of typhoid, we are lessening our immunity; "summer typhoid" and unsanitary conditions at summer resorts. 500 words. Municipal Journal and Public Works, June 7. 10 cts.

**Wells:**

Artesian Well Experience at Baton Rouge, La. Larger well casing gives increased flow; temperature a factor in 62 days. 1 ill., 1,000 words. Engineering News-Record, June 12. 20 cts.

Features of the Well System of the Dayton, O., Water Works. Four groups of wells; overcoming air trouble. By H. C. Wight, supt., Division of Water, Dept. of Public Service, Dayton. 800 words. Municipal and County Engineering, June. 25 cts.

How Vinton, Ia., Obtained a Dual System of Water Supply. Deep wells and air-lift pumps; water rates. By J. H. Dunlap, asso. professor of hydraulics and sanitary engrg., University of Iowa, Iowa City. 3 ills., 1,000 words. Municipal and County Engineering, June. 25 cts.

Relation of a Private Well to Typhoid. Average well a public menace; results of well water tests in Indiana. By H. E. Barnard, state food and drug commissioner, Indiana. 1 ill., 2,200 words. American City, June. 35 cts.

Design and Tests of Highly Efficient Air-Lift Installation at Fort Bliss, Tex. Novel foot piece, well proportioned eduction pipe, and special tanks give 51.9% air-lift efficiency; overall efficiency 28.6%; test figures and operating costs. By Capt. J. F. Brown, Engrg. Branch, Construction Division of the Army, Kansas City, Mo. 3 ills., 2,800 words. Engineering News-Record, June 5. 20 cts.

**Miscellaneous:**

Waterworks Office Appliances. Addressing machines and adding machines found in large percentage of offices; other appliances used; waterworks as a business. 1,100 words. Municipal Journal and Public Works, June 7. 10 cts.

Laying Water Mains in Alleys. Arguments in favor and objections; proved unpractical in Davenport. By C. R. Henderson, manager, Davenport Water Works Co., Davenport, Ia. 1,200 words. Municipal and County Engineering, June. 25 cts.

Break in Water Mains. Organization, equipment, and records needed to control flow from such breaks; subways have complicated problem; main factors to be considered in handling breaks in mains and methods to be employed. By Wm. W. Brush, deputy chief engr., dept. water supply, gas and electricity, N. Y. C. 1 ill., 3,000 words. Fire and Water Engineering, June 4. 15 cts.

Cement Joints for Cast-Iron Water and Gas Mains at Vallejo, Calif. Satisfactory experience in use of cement instead of lead reported by Philip Schuyler, ass't engr. of Mare Island project of U. S. Housing Corporation. 1,100 words. Engineering News-Record, June 19. 20 cts.

An Interesting Comparison. Bids on contract for proposed gravity water supply system at Newark, N. Y., compared with those of similar contract at Le Roy, N. Y., awarded four years ago; prices in both cases remarkably low. 1,000 words. Fire and Water Engineering, June 11. 15 cts.

Study of Revenue from Sale of Water to Metered Domestic Consumer. New England Water Works Association form based on service and output charge alone rational and equitable; basing revenue estimates on unregistered water leads to error. By Philip Burgess, engr., Columbus, O., before the Indiana Sanitary and Water-Supply Ass'n. 3 ills., 2,300 words. Engineering News-Record, June 5. 20 cts.

Municipal Ownership of Waterworks. Editorial discussion of Mr. Metcalf's paper before the American Waterworks Association, appearing in this issue. 400 words. Municipal Journal and Public Works, June 21. 10 cts.

The War and the Waterworks. Effect of the war period—1914 to 1918—and public control upon the waterworks of the United States. By Leonard Metcalf, of the engrg. firm, Metcalf & Eddy, Boston. 4,000 words. Municipal Journal and Public Works, June 21. 10 cts.

The War and the Water Works. Tables and diagrams presenting data referred to in the discussion of this subject last week, by Leonard Metcalf. 5 ills., 2 tables, 500 words. Municipal Journal and Public Works, June 28. 10 cts.

Some New York State Water Works. Several plants in western and central sections of state, described by superintendents and illustrated. Jamestown, by Lyman P. Hapgood, supt.; Watertown, by J. W. Phippen, supt.; Cohoes, by J. T. Gorman, commissioner of public works; Oswego, by Wm. A. McCaffrey, supt.; Schnectady, by T. M. Townsend, supt., bureau of water; Auburn, by J. W. Ackerman, chief engr. and supt.; Seneca Falls, by A. N. French, supt.; Elmira, by H. M. Beardsley, general mgr. 11 ills., 8,000 words. Fire and Water Engineering, June 4. 15 cts.

New Waterworks Systems for Amherstburg and Ojibway, Ont. Quantity of water required and quality of water; filtered water delivered to Amherstburg by 3 motor-driven centrifugal pumps; design of Ojibway plant. By C. W. Tarr, vice-pres., Morris Knowles, Ltd., Windsor, Ont. 2,000 words. Canadian Engineer, June 5. 15 cts.

Observations on Water Supply in Russia. Large cities have fairly well-equipped water works, smaller places often have no public supply. By Geo. C. Whipple, prof. of sanitary engrg., Harvard University. 2 ills., 1,100 words. American City, June. 35 cts.

Ottawa's Water Supply. Description; high per capita consumption attributed to number of government buildings; new pumping plant, placed in operation in 1917; overland piping system. By W. E. MacDonald, city water works engr. 3 ills., 1,500 words. Fire and Water Engineering, June 4. 15 cts.

Ancient, War-Time and Present Water-Supply in Jerusalem. How Gen. Allenby's engineers brought water from Nile across desert; ancient and new permanent water-supplies of Jerusalem; important part played by caterpillar tractors and modern pipe. By H. Y. Carson, Central Foundry Co., N. Y. C., lately with American Red Cross Commission. 5 ills., 2,000 words. Engineering News-Record, June 5. 20 cts.

Public Control of Water. Editorial reference to penalty imposed upon Jersey City by state for using from Rockaway river more than the 100 gallons per day per capita allotted to it. 250 words. Municipal Journal and Public Works, June 14. 10 cts.

The 25-Mile Gravity Pipe Line of Everett, Wash. Project designed by Burns & McDonnell, of Kansas City. By W. A. Scott. 14 ills., 3,500 words. Engineering World, June 15. 15 cts.

Safeguarding Municipal Water Supplies by Tree Growth. Trees the best crop for reservoir lands; method of planting and seeding. By P. D. Kelleter, Forest Service, Department of Agriculture. 3 ills., 1,800 words. American City, June. 35 cts.

## LIGHT AND POWER.

**Hydro-electric Power:**

Hydro-Electric Development on Nipigon River. Five units will be installed, totalling 60,000 h. p., at Cameron's Pool, near Port Arthur, Ont.; concrete dam 200 feet long, 43 feet high; scroll cases to be moulded in concrete. 8 ills., 1,500 words. Canadian Engineer, June 12. 15 cts.

Ontario Power Co.'s Plant Extension. Rapid construction of new unit at Niagara Falls was necessary to supply demands. By H. A. Gardner. 9 ills., 4,500 words. Engineering World, June 1. 15 cts.

Structural Details of Plant Extension at Niagara Falls. Plant extension by hydro-electric power commission to increase capacity by 40,000 h. p.; structural features; equipment involved. 9 ills., 3,500 words. Electrical Review, June 21. 30 cts.

Water Conservation for Massachusetts. Discussion before legislative committee by public officials emphasizes importance of utilizing water power now wasted. 600 words. Electrical World, June 14. 15 cts.

Some Hydro-Electric Developments of Moderate Size in New England. Description of plant at Rumford Falls on Androscoggin River. 5 ills., 2,200 words. Engineering World, June 15. 15 cts.

Economical Section of Water Conduit for Power Development. Formula for best slope and size of conduit is deduced, which takes into account construction costs, value of power recovered, rate of returns expected on expenditures, and other physical conditions of problem. Excerpt from paper before American Society of Mechanical Engineers, by C. T. Hutchinson, consulting engr., N. Y. C. 2 ills., 2,000 words. Canadian Engineer, June 19. 15 cts.

**Gas:**

Municipal Ownership of Gas Properties. Individualism and democracy are not in harmony with conditions surrounding public operation of utilities. By Walton Clark, Philadelphia. 1 ill., 2,500 words. Gas Age, June 16. 20 cts.

Causes Necessitating Increased Gas Rates. Analysis of the effect of surplus gold, increased expenses and decreased supply of material, prepared for Natural Gas Association. By F. C. Hamilton, Pittsburgh. 2 ills., 3,000 words. Gas Age, June 16. 20 cts.

The Law with Regard to Consumers Stealing Gas. Digest of American and English decisions by upper courts, upon which law relating to theft of gas is based. 2,700 words. Gas Age, June 16. 20 cts.

**Street Lighting:**

A Modern Ornamental Street Lighting System. Now in course of construction in Cincinnati, extending over seven miles of streets. 5 ills., 1,000 words. American City, June. 35 cts.

Chicago's Tunnels for Electric Light and Power Cables. Details of Commonwealth Edison Co.'s tunnels; construction methods employed; relative advantages of tunnels and conduit. By G. B. Springer, civil engr., Commonwealth Edison Co. 10 ills., 3,500 words. Electrical Review, June 21. 30 cts.

**Miscellaneous:**

Reinsulation of Large Generators. To provide against interrupted service on its lines during period of heavy winter peak loads, Milwaukee company follows this practice; engineering experience gained in handling four machines totaling 43,000 K. W. 1 ill., 2,500 words. Electrical World, June 21. 15 cts.

Comparison of Mechanical Stokers. Classification; salient features of the different stokers; influence of stoker upon draft, combustion chamber, etc. By Rob. June, mechanical engr. 3 ills., 3,000 words. Electrical Review, June 21. 30 cts.

220,000-Volt Transmission an Immediate Possibility. Especially adapted to bringing large blocks of power from coal mines and water powers to industrial markets; technical problems not serious; some research necessary. 5 ills., 3,700 words. Electrical World, June 28. 15 cts.

National Planning for Electric Power. Efficiency must lower cost and power and human resources must be conserved; Secretary Lane's proposed survey is economic and will measure present and future power requirements. By Dr. Geo. Otis Smith, director U. S. Geological Survey. 3 ills., 2,000 words. Electrical World, June 7. 15 cts.

## STREET CLEANING AND REFUSE DISPOSAL.

Vacuum Cleaning the Streets of San Diego. Machine mounted on motor truck; has two engines, one to run truck and the other to operate broom. By W. S. Draper, foreman, Operating Department, Bureau of Streets. 1 ill., 300 words. American City, June. 35 cts.

Lower Refuse Collection Wagons. Editorial on the cruelty to ash and garbage collectors in compelling them to lift containers above their heads to empty them into the collecting wagons. 300 words. Municipal Journal and Public Works, June 28. 10 cts.

Refuse Collection in Rochester. Present conditions and practices and recommended changes; organization of force; equipment and methods employed; report of Bureau of Municipal Research. 2 ills., 3,000 words. Municipal Journal and Public Works, June 28. 10 cts.

Waste Reclamation: A New Municipal Function. War methods which caught the dollar at the dump; war-time necessity becomes community blessing. By H. L. Baldensperger, chief, Waste Reclamation Service, U. S. Department of Commerce. 1,500 words. American City, June. 35 cts.

## FIRE DEPARTMENT.

Private Fire Protection. Report of Committee of American Waterworks Association giving recommendations for procedure in installing and charging for private fire devices. 2,700 words. Municipal Journal and Public Works, June 21. 10 cts.

Private Fire Services. Editorial reference to the report in last week's and the discussion in this week's issue on the subject. 150 words. Municipal Journal and Public Works, June 28. 10 cts.

A 35-Mile Fire Protection Line. Extension to Philadelphia high pressure service; accepted after severe and unusual tests; results obtained and service given satisfactory. By C. W. Presdee. 2 ills., 1,300 words. Fire and Water Engineering, June 4. 15 cts.

San Francisco's High Pressure Fire Service. Formerly maintained as reserve supply, now used as main fire-fighting system; difficulties of high pressure controlled by use of reducing valve; description. 4 ills., 1,400 words. Municipal Journal and Public Works, June 21. 10 cts.

"My Hardest Fought Fire." Chiefs from every section of this country and Canada describe their most difficult instance of fire fighting; methods employed and problems met; bravery and endurance of men emphasized. 8 ills., 8,000 words. Fire and Water Engineering, June 18. 15 cts.

The Fire Engine. Considered in its relation to essentials of fire fighting; brief historical sketch of development of apparatus; caliber system of standard fire streams; losses in fire hose. By C. H. Fox, Cincinnati. 3,500 words. Fire and Water Engineering, June 18. 15 cts.

New Type Rotary Fire Pump. Produced by the International Motor Co.; lateral intake and discharge; hardened steel pilot gears; low pressure packing; record at Chicago fire. 2 ills., 1,200 words. Fire and Water Engineering, June 18. 15 cts.

Fire Prevention Increasingly Necessary. A series of suggestions on experiences in Indianapolis. By J. H. Hilkene, director of fire prevention, Indianapolis. 1 ill., 3,000 words. American City, June. 35 cts.

Personal Liability for Fires. The proper placing of responsibility for fires caused by negligence; laws on subject, and interpretation; compulsory removal of dilapidated buildings that are menace. By J. G. Gamber, state fire marshal of Illinois. 1 ill., 1,500 words. June 4. 1,500 words. June 11. Fire and Water Engineering. 15 cts.

Kansas City Fire Department. The interesting history of the convention city's fire-fighting forces; the two international teams; record of steady development in the department under leadership of capable officers. 12 ills., 4,500 words. Fire and Water Engineering, June 18. 15 cts.

Observations and Experiences. Fire captain should profit by happenings of daily routine; necessity of knowing buildings in his district; vital importance of frequent inspections; avoid water damage. By Capt. C. W. Tisdale, Ladder Co. No. 5, Jersey City Fire Department. 2,000 words. Fire and Water Engineering, June 11. 15 cts.

## STRUCTURES AND MATERIALS.

The Organization of a Standard Municipal Testing Laboratory. Should be owned by every progressive municipality; duties and functions of laboratory; arrangement and equipment. By J. O. Preston, ass't engr., Bureau of Municipal Research, Rochester, N. Y. 1 ill., 4,200 words. Engineering and Contracting, June 4. 15 cts.

Aggregates Too Coarse in Bureau of Standards Tests. Most of aggregates are of unusual gradings which were advised against in use of fineness-modulus method. By Duff A. Abrams, prof. in charge of the Structural Materials Research Laboratory, Lewis Institute, Chicago. 2,500 words. Engineering News-Record, June 12. 20 cts.

Tests of Two Recent Theories for Proportioning Concrete. Fineness-modulus and surface-aggregate methods, both of which depend on water-cement ratio, do not seem to insure the necessary workability of mix. By G. M. Williams and Watson Davis, asso. engr. and ass't engr., respectively, U. S. Bureau of Standards, Washington, D. C., 6 ills., 4,500 words. Engineering News-Record, June 12. 20 cts.

Surface Aggregate or Fineness-Modulus for Concrete. Prof. Duff A. Abrams defends fineness-modulus theory of proportioning concrete and gives his objections to the surface-area theory proposed by L. N. Edwards. Letter by L. N. Edwards, senior highway bridge engr., Bureau of Public Roads, Washington, D. C., and reply hy D. A. Abrams, prof. in charge, Structural Materials Research Laboratory, Lewis Institute, Chicago. 5,000 words. Engineering News-Record, June 19. 20 cts.

Tests Do Not Bear Out Surface Area Method? Six criticisms of Capt. Edwards' theories; areas of finest particles cannot be satisfactorily dealt with; separate treatment for each aggregate; laborious computations necessarry; not clear how method can be applied to simplest problems. By Prof. Duff A. Abrams. 4,000 words. Canadian Engineer, June 26. 15 cts. 5,000 words. Engineering and Contracting, June 25. 15 cts.

Studies in Surface Area Proportioning Method. Hydro-electric power commission of Ontario satisfied that surface area method of proportioning materials of mortars and concretes is correct in principle; fineness-modulus varies as surface area; not necessary to obtain actual surface area of aggregate. By R. B. Young, ass't laboratory engr., Hydro-Electric Power Commission of Ontario. 5 ills., 3,000 words. Canadian Engineer, June 26. 15 cts.

Advantages in Use of Calcium Chloride Solution to Hasten the Setting of Cement Concrete. H. Eltinge Breed describes results of tests by the N. Y. Commission of Highways. 1 ill., 300 words. Municipal and County Engineering, June. 25 cts.

Tests of New York State Department in Use of Calcium Chloride in Hastening Setting of Concrete. 1 ill., 300 words. Engineering and Contracting, June 4. 15 cts.

Concrete in Roads, Bridges and Culverts. Fine aggregate should be tested for organic impurities, gradation (sieve analysis), mortar strength and volume of silt or loam; coarse aggregate cannot be tested in field; Deval abrasion test. Paper before Canadian Good Roads Congress by H. Eltinge Breed, consulting engr., N. Y. C. 1 ill., 3,000 words. Municipal and County Engineering, June. 25 cts.

Municipal Freight Handling Dock and Cranes at St. Paul. City now prepared to convey freight from the Mississippi River to storage yards, trucks or railroad cars. 1 ill., 300 words. Engineering News-Record, June 5. 20 cts.

Mechanical Handling the Feature of Concrete Pile Yard. At Norfolk army base both bearing and sheet piles were rapidly turned out in plant at which manual labor was reduced to a minimum; concrete mixed alongside each pile. 8 ills., 2,300 words. Engineering News-Record, June 12. 20 cts.

Construction of New Arch Section of Galveston Causeway. Centrifugal and jet pumps mounted on derrick platforms; permanently lagged steel arch centres; old causeway walls used for cofferdam. 7 ills., 2,000 words. Engineering News-Record, June 19. 20 cts.

Points Requiring Special Observation and Investigation in Bridge Inspection. Secondary stresses due to large gusset plates; effect of position of track on bridge capacity; impact allowance with roadway and sidewalk loads; reduction of strength by corrosion and bolt holes. From paper before Brooklyn Engineers' Club, by H. C. Keith. 3,700 words. Engineering and Contracting, June 25. 15 cts.

## TRAFFIC AND TRANSPORTATION.

### Motor Trucking:

Relieving Congestion in Baltimore's Delivery District. Comprehensive plan now being carried out is noticeably improving traffic conditions, particularly in the half-mile-square dense business region. By L. H. Palmer, ass't to pres. United Railways and Electric Co. 5 ills., 3,000 words. Electric Railway Journal, June 7. 15 cts.

Electric Trucks and Transportation. Advantages of the electric truck and comparisons with other vehicles; operating data of American Railway Express Company. By E. E. Laschum, gen. supt., American Railway Express Co. 1 ill., 2,800 words. Electrical Review, June 7. 30 cts.

Trucks and Trailers in City Hauling. By their use Boston haulage firm in 3 years has tripled tonnage handled by it. 1 ill., 800 words. Engineering and Contracting, June 4. 15 cts.

Items Which Must Be Considered in Calculating Cost of Truck Operation. Comparing truck cost figures with rail rates; cost keeping. 1,500 words. Engineering and Contracting, June 4. 15 cts.

### Street Railways:

Economies of the Skip-Stop. On basis of elimination of one stop per mile, at 1.3 cents per stop, will save $30,000,000 annually. By J. A. Beeler, consulting engr., N. Y. C. 2,000 words. Electric Railway Journal, June 7. 15 cts.

Zone Fare in Practice in Dublin, Ireland. Remarkably good results secured from two fare increases during 1918, despite reductions in service which were due solely to shortage of coal; five examples given of how to build up traffic by having riders pay for what they choose to take. By Walter Jackson. 9 ills., 4,000 words. Electric Railway Journal, June 7. 15 cts.

The Zone Fare in Practice in West Ham, England. Universal fare tried for a brief period, but abandoned; present differential rates include no half-penny fares for general use; although city is located in the most typical labor borough of London, the average earnings per car-mile exceed 30 cents. By Walter Jackson. 13 ills., 4,500 words. Electric Railway Journal, June 14. 15 cts.

The Zone Fare in Practice in Reading, England. More than 180 rides per passenger per annum in community of 88,000; combination of penny short rides and 1½-penny rides from centre to end of line, with second collection if ride is across town; recent fare increase has been successful in increasing revenue. By Walter Jackson. 11 ills., 3,000 words. Electric Railway Journal, June 28. 15 cts.

Safety Cars Increase Earnings 25% in Terre Haute. 30 one-man cars placed in service in December have also increased car miles 25%, reduced accidents and won popular favor. 4 ills., 3,000 words. Electric Railway Journal, June 28. 15 cts.

Safety Car Is a Live Proposition. This type of equipment in both large and small cities will give better and more frequent service. By P. J. Kealy, pres., Kansas City (Mo.) Railways. 2,700 words. Electric Railway Journal, June 14. 15 cts.

Higher Prices Are Sure to Continue.

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# NEWS OF THE SOCIETIES

**Aug. 26-28.**—LEAGUE OF CITIES OF THE THIRD CLASS IN PENNSYLVANIA. Twentieth annual convention, Allentown, Pa. Secretary, Fred H. Gates, city clerk, Wilkes-Barre, Pa.

**Aug. 27-29.**—VIRGINIA STATE FIREMEN'S ASSOCIATION. Thirty-third annual meeting, Charlottesville, Va. Secretary, E. K. Landis.

**Oct. 27-30.**—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, New Orleans, La. Secretary, A. W. Hedrich, 169 Massachusetts ave., Boston, Mass.

**Nov. 12-14.**—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Springfield, Ill.

## New York State Conference of Mayors and Other City Officials.

The tenth anniversary meeting of the conference of Mayors and Other City Officials of New York State was held June 10, 11 and 12 in Schenectady, N. Y., the program already announced in these pages being substantially followed. The New York State City Clerks' Association met at the same time.

Opposition to limiting city tax rates, adequate laws for controlling appropriations for city schools, and non-interference by the state and organized groups of city employes in the administration of city affairs were advocated by mayor Walter R. Stone of Syracuse, president of the conference, in his opening address. Mayor Stone expressed the belief that those who are advocating limitations on municipal tax levies are applying the remedy at the wrong place. It is not the power of the city to raise funds that should be limited, he contended, but the activity of those who are trying to force the city to spend beyond its ability. Continuing, he said:

"In my opinion the only way to hold municipal expenditures within bounds is to make every man and woman directly share the burden of taxation, and to stop the activities of groups of municipal employes who use their political influence for purely selfish purposes. By so doing those who advocate costly municipal reforms will be forced to consider the expense their plans involve and which they will have to share, and those officials who are directly accountable to the people for the cost of municipal government may exercise their judgment unhampered by the political influence at home or at Albany of organized groups of civil employes. The interference by the state in the administration of local affairs and the political activity or organized civil employes for selfish purposes are becoming a menace to efficient city government. An adequate home rule constitutional amendment will help to check this interference and a simplified tax system and the elimination of all tax exemptions will make all directly feel and bear the tax burden."

Mayor Stone summarized as follows the co-operative work of the cities during the last session of the Legislature:

"Ninety-six per cent. of the bills the cities opposed through the Conference were defeated and thirty-two per cent. of the measures they advocated are now laws. As a result of the co-operation of the cities mandatory bills, involving an annual tax burden of at least $25,000,000 were killed, and the two tax bills which we worked hard to have enacted, are laws and will increase the revenue of the cities approximately $28,000,000 a year."

Mayor Stone characterized as "comprehensive, constructive and conservative" the utility bill which the cities presented last winter for the consideration of the Legislature. "It is not a municipal ownership bill," he declared; "it does not even express a preference for that solution of the utility problem." After describing each of the utility measures which the Legislature refused to pass, Mayor Stone concluded: "The Legislature refused either to grant to the cities authority to solve their utility problems or to adopt the relief sought by the utility companies. It also declined to approve radical municipal ownership proposals or bills which would have permitted a utility to unload on a city. The state has, therefore, done absolutely nothing to relieve the utility situation or to make a solution of the problems possible. These utility ills are, however, still with us, and, so far as traction service is concerned, are becoming more acute in many of our cities. I am satisfied that when the state does not enact a utility law, the plan we have proposed will be the one adopted. The cities cannot be blamed for any lack of effort on their part to secure adequate utility service at reasonable cost. From now on it is the state which must accept the responsibility."

The efficiency of health work in the cities of New York state and the shortcomings of municipal health departments as shown by the investigation by the State Department of Health during the past year were discussed by Dr. Charles C. Duryee. Dr. Duryee announced that the health departments of cities in this state having a population between 50,000 and 175,000 received an average score of 801.5 out of a possible 1,000 points. The lowest score was 565.2 for cities having a population less than 10,000.

The investigation showed that everywhere public health nurses are becoming active agents in assisting health officers. Tuberculosis is being well reported, but whooping cough, mumps and measles are poorly reported. The chief cause for criticism of local health departments is the lack of efficient investigation about sources of infection. The State Department reports that in some cities infant and maternal welfare work is being done by private organizations with no supervision by the local health department. It also finds that the supervision of milk is progressively improving.

Lack of a uniform system for keeping public health records was criticised by Dr. Duryee, as was also the inadequate clerical forces maintained by many cities. He also severely criticised the accounting systems of health departments. "In a few cities," he said, "it was practically impossible to determine what had been spent for public health work. In some others the health budget contains many items that are not generally conceded as properly belonging to it."

Mayor Midlam, of Rome, presented an interesting report on the year's activities of the State Bureau of Information, operated for the benefit of the members of the conference. A large number of both local and state-wide problems were studied, researches made and reports issued. Particularly effective work was done in a survey of water consumption in the cities and a campaign, afterwards taken up by the Federal Fuel Administration, was started. Besides aiding the cities in their particular problems, the Bureau did much work for committees of the state legislature on bills affecting cities. Requests for information were received from 547 officials of the state and 190 from other states. The bureau sent out 3,015 reports to city officials in the state during the year. Summing up, Mayor Midlam stated these four accomplishments:

1. We have substituted facts for guesses in municipal work in New York State.
2. We have made it impossible for any city official to excuse a waste of public funds on theories and experiments which have failed in other cities.
3. We have made available to all city officials the best thoughts and efforts of every American city, so that failures may be avoided and successes repeated.
4. We present singly and en masse the facts, opinion and advice of the city administrations of the state for the information of the public and as a guide to those who are seeking the solution of state-wide municipal problems, thereby broadening the perspective of the legislators whose views would otherwise be self-centered, and placing above selfish interests the general welfare of all.

"A definite program for definite action looking to the transformation of the street railway business into a full-fledged public utility owned and operated by the community for the public benefit" was the solution of the traction problem proposed by Delos F. Wilcox.

"Although the street railway crisis is acute and the demand for immediate action of some kind or other is pressing," he continued, "still it can be safely predicted that the crisis will not pass and the problem will not be settled until public bodies have the power and the initiative to undertake the performance of this function. It seems strange indeed that the legislature was unable to bring itself to the point of

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# INDUSTRIAL NEWS

### The Lime Association.

At the first annual meeting of the Lime Association, Mather building, Washington, D. C., held in Pittsburgh, five standing committees were appointed, in accordance with a plan of co-ordination. The general welfare of the lime industry is in the hands of the committees in the matters for which they are respectively responsible.

To facilitate the work of these committees, a member of the staff of the association has been appointed as secretary of each one. It is anticipated that much of the routine can be handled at the general office, thus relieving the chairmen of any unnecessary detail and setting up a logical point of contact between the individual manufacturers and the several chairmen.

The committee on Trade Practices will have for its work the task of changing the merchandising of lime from a buyer's market to a seller's market. Practically all questions concerning quotations, contracts of sale, analyses at destination, protection against decline in prices, uniform cash discount, sales for future delivery, and numerous other knotty problems will be handled by this committee.

The committee on Statistics will determine the best use to be made of the statistics now being gathered from the industry on the production and distribution of products, and such other information as may from time to time be found necessary and desirable for the general benefit of all the manufacturers. The work of this committee will furnish an index for future activities of the association with a view to securing immediate tonnage where most needed.

Other committees are those on Credits and Collections, Uniform Cost Accounting and Accident Prevention and Insurance.

**The United States Asphalt Refining Company,** 90 West street, New York, which produces "Aztec Asphalt," has issued a useful device for determining the proper grade of asphalt to be used under various conditions of temperature and traffic for various types of construction. The device is in the form of a desk weight and consists of three concentric dials divided as follows: Outer—penetration construction, sheet asphalt, asphaltic concrete (Topeka), asphaltic macadam (hot-mix); intermediate—high temperatures, low temperatures, moderate temperatures; center—heavy traffic, light traffic, moderate traffic. By turning the dials so that the existing combination of conditions is registered, the grade number of the asphalt required is found through openings in the dials.

The indicator is of very neat and substantial construction and should prove decidedly handy to any engineer or contractor engaged in street construction. To anyone who is responsible for the actual choice of materials, the company will send one of these indicators with its compliments.

### New Low Level in Trinidad Asphalt Lake Soundings.

Recent borings made in the famous asphalt lake on the Island of Trinidad have reached a new low level record of 150 feet. The previous record, made in 1893, was 135 feet. On both occasions the asphalt was found to be of uniform character throughout.

These latest attempts to find the bottom of the great mass of asphalt were conducted by George A. MacCready, geologist, at the instance of Dr. Clifford Richardson, who has studied this asphalt wonder for many years. Great difficulties attend any attempt to sound the lake as it is in constant, though almost imperceptible, motion. The pressure of the mass of asphalt at any great depth against the drilling apparatus causes it to bend and the deflection from the perpendicular is so great that further boring is prohibited.

In the borings which have just been made, a core of asphalt was taken by driving a small pipe into the pitch and then withdrawing it with its contained core of pitch. Following this, a pipe of 2-inch diameter was driven to the lowest depth to which the core was taken and the material forced into it by driving was removed by means of a water jet and bit. Another core was taken below the 2-inch pipe in the untouched pipe. The deepest of these borings was taken at the center of the pitch lake, and the asphalt was found to be of uniform character throughout. After completion, this hole was observed to have shifted at the surface 25 feet in six weeks; a survey showed the movement to exist as deep as 100 feet, and there was a suggestion that the direction was reversed at the depth of between 25 and 50 feet. The other borings, not at the center of the lake, shifted to a lesser extent. The movement of the asphalt seems to be similar in many respects to the ascending and descending currents in a kettle of boiling water.

The problem presented is difficult of solution, as it seems to be impossible to find any material which will withstand the bending strain imposed upon it by the pressure of the mass of semi-solid asphalt.

# NEWS OF THE SOCIETIES

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passing an act that would put the municipalities in the position, theoretically at least, where they could take hold and help solve this street railway problem."

Regarding the suggested solution by increasing rates, Mr. Wilcox said: "The street railway companies in this country have been flirting with permanent ruin by the pursuit of a rate policy that tends to diminish their usefulness as a public utility by driving away traffic, particularly that portion of it which is from the financial point of view most profitable to the carrier."

Mr. Wilcox expressed the belief that the fundamental defect in the street railway financial policy is the tendency of the private companies to be forever pushing for a bigger capitalization or a bigger capital value. The foundation of the structure of street railway investments in this country, he said, is rotten, and he gave this as one of the fundamental reasons why the business has been unable to weather the storm of war times.

"I do not believe that this is the only reason," he continued, "but I do say that no plan which calls upon the public to pour more revenue and still more into the coffers of the street railways will result in putting them on their feet financially without wrecking them as public utilities, unless this rotten financial foundation is removed and the whole structure rebuilt on a sound basis. I gravely doubt the possibility of getting a street railway business upon a sound basis with its own consent. It feels desperately sick and would like to be cured, but apparently it prefers death to castor oil. I do not anticipate that the committees of electric railway associations and the United States Chamber of Commerce, or even the new federal advisory commission will get very far in helping the bankrupt companies unless they prescribe a disagreeable remedy."

The public service commission was requested by a resolution that in hearing arguments for increased rates by public utilities corporations the burden of proof be placed upon the corporations. The mayors took the attitude that thus far the cities have been obliged to take the burden of proving the fact that the increased rates were unnecessary. Another resolution requested the appointment of a legislative committee to meet with a committee of mayors to arrive at a uniform tax budget.

The officers of the present year were re-elected as follows: Mayor Walter R. Stone, of Syracuse, president; Mayor James T. Smith, of Utica, vice-president; William P. Capes, secretary; James R. Watt, Albany, treasurer; H. Clayton Midlam, of Rome, and Palmer Canfield, Jr., of Kingston, members of bureau council.

Dr. James Sullivan, state historian, addressing the convention of city clerks, advocated life tenure of office and adequate salaries for city clerks as the only means by which valuable records of the cities could be kept and made readily accessible. Dr. Sullivan spoke on "Public Records, Their Preservation." He said in part:

"To accomplish the kind of work for

which a city clerk is really put in office, also implies a good remuneration so that he will not be tempted to leave his job to take up another which is more satisfactory from the point of view of salary. With permanency of tenure and sufficiency of income taken care of, the city clerk would be likely to devote his energies to scientific and business-like supervision of the public records.

"In the cities of this state there is the greatest variety in the matter of the care of municipal records. In some places they have excellent equipment both from the point of view of fire proofing and classification. In others the records are so kept that if a fire were to take place nothing would be left of them, and they are so arranged that the greatest difficulty is encountered in consulting them. Between these two extremes there is a gradation from the very best to the very worst."

Dr. Matthias Nicoll, Jr., deputy state health commissioner, addressed the session of the city clerks' convention on "The Marriage Law and Public Health." He discussed the amendment to the domestic relations law which requires the clerk to secure an affidavit from contracting parties relative to venereal diseases and declared that it is slowly but surely fulfilling the purpose for which it was designed.

### . American Association of Engineers .

The Board of Directors of the American Association of Engineers has named an organization committee to formulate a plan to carry out the instructions of the annual convention, contained in the resolution providing for the promoting of the non-technical interests of engineers in public service and to make a national study of proper pay for engineers. The committee consists of A. N. Johnson, consulting highway engineer, Portland Cement Association, Chicago; A. R. Hirst, state highway engineer, Madison, Wis.; Samuel C. Haddon, editor Municipal and County Engineering, and Dr. F. H. Howell, president of the association.

The Salt Lake Club of the American Association of Engineers has been organized with R. B. Ketcham, Dean of the University of Utah, as chairman, and Eugene Bush, 273 Tenth ave., Salt Lake City, as temporary secretary. Petition for a chapter charter will be circulated so that the chapter can be installed by president Howell when he visits Salt Lake City this summer.

## PERSONALS

Simonds, Fred W., formerly city engineer of Rahway, N. J., has been appointed city manager of Elizabeth, N. C.

Gilmer, D. E., of Hutchinson, Kans., has been appointed superintendent of construction, Federal-aid roads, Reno County.

Older, Fred, Adrian, Mich., has been appointed city engineer of Ypsilanti, Mich., succeeding W. R. Caldwell.

Munroe, Julius K., has been appointed state road commissioner of West Virginia, with headquarters at Charleston, succeeding T. S. Scanlon, resigned.

Hommon, Major H. B., Sanitary Corps, formerly in charge of the water supplies in the Advance Section, A. E. F., recently returned. Major Hommon was on leave of absence from the U. S. Public Health Service, and will return to his former position early in July, with headquarters at Cincinnati, Ohio.

Strait, M. W., Zanesville, Ohio, has been appointed city engineer of Anderson, S. C.

Felps, C. T., of the 23d Engineers, A. E. F., has been appointed division engineer, State Highway Commission of Kansas.

Hungerford, A. B., who was recently appointed city engineer of Hudson, Kan., has been appointed city manager.

Cook, Charles C., has resigned as city engineer of Wheeling, W. Va. He had served for sixteen years.

## MUNICIPAL INDEX

(*Continued from page 27*)

Failure of fares to correspond to other prices is one of most conspicuous examples of the injustice of the depreciated dollar. By Irving Fisher, professor of political economy, Yale University. 1,600 words. Electric Railway Journal, June 7. 15 cts.

Sewer Work Puts Extra Tax on Ways Department in Brooklyn. Tracks had to be removed and temporary routes provided to insure minimum interference with passenger traffic. 3 ills., 800 words. Electric Railway Journal, June 28. 15 cts.

**Highway Transport Engineering:**

Highway Transport Engineering—a New Technical Field. Breadth of training necessary for the transport engineer; many problems to be solved; suggested course of study. 1.000 words. Engineering News-Record, June 12. 20 cts.

Highway Transport Engineering. This branch of engineering deals with science, art, economics and business of highway transportation of passengers and commodities; subjects of which highway transport engineer should have knowledge. Presidential address at meeting of National Highway Traffic Ass'n, by A. H. Blanchard, consulting highway engr., N. Y. C. 1,500 words. Good Roads, June 21. 10 cts.

Highway Transport Engineering: A New Field for Engineers. Comprehensive courses offered by educational institutions should include economics, political economy, social science, business and contract law, scientific management, interstate commerce, marketing and distributing systems, etc. 1,000 words. Engineering and Contracting, June 4. 15 cts.

### MISCELLANEOUS.

Some Engineering Problems of City Planning. Abstracts of papers before the National Conference on City Planning held at Niagara Falls and Buffalo last week; regional planning, industrial cities, steam railroad and city plan, common sense of civic centres. Papers by Thomas Adams, housing and town-planning adviser of the Canadian Government, Ottawa; John Nolen, city planner, Cambridge, Mass.; E. J. Fort, city manager, Niagara Falls, N. Y.; N. P. Lewis, chief engr., Board of Estimates and Apportionment, N. Y. C. 3,000 words. Engineering News-Record, June 5. 20 cts.

Shade Trees in Streets. City authorities possess broad powers for removal of trees, if in their judgment such removal is of public benefit; conditions under which citizens can obtain injunction; court decisions. By John Simpson. 2,400 words. Municipal Journal and Public Works, June 14. 10 cts.

Preserving Shade Trees. Editorial comment on the slaughtering of trees and need for protection which should be contained in city charters. 300 words. Municipal Journal and Public Works, June 14. 10 cts.

Small Municipal Blacksmith Shop. Installed in stable yard of the street department in Waltham, Mass.; proved paying investment. 250 words. Municipal Journal and Public Works, June 14. 10 cts.

Advantages of the Cost-Plus-a-Fee Contract for Building Construction. The old gambling contract; war-time test proves merit of cost-plus contracts. By A. E. Wells, pres., Wells Bros. Construction Co., Chicago, Ill. 1,300 words. Municipal and County Engineering, June. 25 cts.

Unit Price Contracts Versus Percentage Contracts. Great result of unit price method is that during last 49 years unit prices have decreased in face of rising values of labor and materials. By W. L. Darling. 1,400 words. Engineering and Contracting, June 18. 15 cts.

The Engineer in Politics—by One Active Therein. W. A. Stinchcomb, recent candidate for mayor of Cleveland, explains why engineers are fitted for solving political problems. 1,200 words. Engineering News-Record, June 19. 20 cts. 1,500 words. Engineering World, June 15. 15 cts. 1,500 words. Municipal and County Engineering, June. 25 cts.

Presidential Address at Convention of Civil Engineers. Fayette S. Curtis outlines the duties of the engineer and reviews past accomplishments; promises for future. 3,000 words. Engineering News-Record, June 19. 20 cts.

How the American Association of Engineers Aided Engineers in St. Louis Municipal Service in Effort to Improve Their Condition. Table of present and proposed salary scales. By an engineer in public service in St. Louis. 1,800 words. Municipal and County Engineering, June. 25 cts.

Three City Engineers Discuss the Movement Calculated to Improve the Employment Conditions of All Engineers in Public Service. Letters to the editor from H. C. McClure, commissioner of engrg. and constr., Dayton, O.; E. A. Ziesloft, city civil engr., Akron, O., and E. A. Fisher, city engr., Lakewood, O. 1,800 words. Municipal and County Engineering, June. 25 cts.

Progress by Engineering Council's Compensation Committee. Seriousness of situation considered and principles for classification and salary schedule are proposed. 1,500 words. Engineering News-Record, June 19. 20 cts.

Will Common Labor Wages Rise? Effect of lack and restriction of immigration and the labor unions on wage rates of unskilled workmen; need for labor-saving machinery and methods; editorial. 800 words. Engineering and Contracting, June 4. 15 cts.

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City County State

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## MUNICIPALITIES CAN LOWER FOOD PRICES.

The various cities of the country are offered an opportunity by the War Department to purchase canned vegetables and meats and sell the same to their citizens at prices which will be considerably below those being paid in most cities, and should thus be able to aid their citizens in meeting the ever increasing cost of living. The War Department has millions of dollars worth of canned corn, peas, baked beans, string beans and tomatoes, bacon in cans and crates, roast beef, corned beef and corned beef hash, which it will sell to cities in car-load lots at approximately the prices paid in the case of vegetables, and at about 80 per cent. of the cost to the government in the cases of canned and cured meats. The municipality must sell these goods to the public at the cost to it and payment for them may be deferred for a period of ten days after the goods have been actually received by the municipality.

To obtain these, address Surplus Property Officer at the nearest Zone Supply Office, which offices are located at Boston, New York, Philadelphia, Baltimore, Newport News, Atlanta, Chicago, St. Louis, New Orleans, Fort Sam Houston, El Paso, Omaha and San Francisco.

## CO-OPERATION IN PUBLIC SERVICE.

The employer who pays good wages but furnishes his employes with such poor tools that their output is but a fraction of what it should be soon loses money through a discouraged workman as well as because of inadequate tools. If in addition he should deliberately throw obstacles in the way of the work he would be considered foolish if not crazy.

But the taxpayers do just that. They employ men to clean the street and, for fear not enough of them will be put on the payroll, they throw papers, cigarette boxes, store sweepings and all kinds of rubbish into the roadway for the sweeper to remove, so that half his time may be spent on these. Or they place their garbage, ashes and refuse in a multitude of small receptacles that require time for emptying, or in leaky ones so that the escaping matter has to be swept and shoveled up, or in such large and heavy ones that the collector is permanently injured in handling them and is pensioned or becomes otherwise a public charge. (See page 37 of this issue.) And these men whose time the taxpayer thus wastes or whom he thus injures are his own employes, being paid with his own money.

The public should have continually put up to them the idea that public servants are their servants; that anything that makes public work cost more adds to their taxes; and that by co-operating with the public employes and facilitating their work they are putting money in their own pockets. We believe that public officials could do much to aid in making the taxpayers realize this, and that they would at the same time make their own work easier and better appreciated.

### AN UNUSUAL WAR RECORD.

Few engineers can claim a war record equal to that of the president of the Illinois Society of Engineers, J. W. Dappert, of Taylorville, Ill. Mr. Dappert did not himself serve directly, but five sons served in the army in France and his daughter was in government service in Washington. One of the sons, Lieutenant J. Ivan Dappert, was killed in action near Albert, France; Lieut. John V. has been in a hospital since the armistice; Capt. Merlin L. and Lieut. Anselmo F. have just returned from France, and Sergeant Boyd H. is still in France.

This is a family record of which Mr. Dappert is deservedly proud; and we have no doubt that the family will, as Mr. Dappert says he hopes to see them, "re-enter civil life with the same spirit they volunteered for army service." All are either practicing or students of civil engineering.

### TAR CONTAINERS.

We just timed three men using an hour of labor in stripping the iron container from a barrel of tar and cutting it into four pieces, to prepare it for heating for filling paving joints. The containers had no heads, and in the summer sun tar had run from such as were not standing plumb. Observation on this and other jobs leads us to estimate that on the average between five and ten per cent of the original contents of tar containers is lost in this way. Both losses could be saved by the adoption of some container that would prevent waste and at the same time facilitate getting the tar into the heater. It would seem as though American ingenuity should be equal to this.

## ASPHALT-COVERED NAPPED-BLOCK PAVEMENT

### A Pavement Being Laid in Newark, New Jersey, Replacing an Old Granite Block, Which Is Being Made Smooth by a Sand-Asphalt Surface—Long-Radius Corners and Sidewalk Replacing.

The city of Newark, N. J., has under construction by contract, and more than half completed, a piece of pavement which is the first of its kind to be laid in that city, and so far as the engineers of the Department of Streets and Public Improvements are aware, has not previously been laid in exactly this form anywhere. The pavement is being constructed of old granite block napped and re-clipped and laid with a filler of sand and asphalt mixed, the novel feature consisting in the addition of a covering of the same sand-asphalt mixture over the entire pavement to a depth of about one-eighth of an inch, thus forming a thin asphalt pavement over the stone blocks. This work is being done under the direction of William A. Howell, engineer of streets and highways of Newark.

While old blocks which have been napped and re-clipped can be made into a smoother pavement than was the original one, it is not ordinarily so smooth as granite block pavements laid after modern specifications. It was in order to obtain a smooth pavement with this material that it was decided to cover it with the sand-asphalt coating. A part of the pavement has now been in service for about two weeks on one of the heavy-traffic streets of the city, and the department is very well satisfied with the service which it gives and promises to give.

The paving in question is being done on Clinton avenue from the West Newark branch of the Pennsylvania Railroad to the west side of Chadwick avenue, the contractor being the Newark Paving Company. This is a very busy thoroughfare which continues as a highway into a thickly populated section of the state of which Newark is the business center. Where this pavement is being laid there is a grade of about two to five per cent. A double street-car track runs through the center of the roadway and the street railway company is under obligation to provide for the paving in and between these tracks and for one foot beyond on each side. As is now commonly the case in paving city streets in which there are tracks, one-half of the street was entirely completed before the other half was torn up, thus leaving for the service of wheeled traffic one side of the street entirely free from obstruction.

The old pavement had been constructed with granite blocks about eight inches deep laid without any concrete base. The new pavement consists of the same granite blocks taken up and broken or napped and dressed to give a flat top and reasonably close joints, with a depth of between five and five and a half inches, and laid on an eight-inch concrete foundation and a 1½-inch sand cushion. Reducing the depth from eight inches to five and a half inches reduces the total volume of granite used by about 35 per cent., and the waste from broken blocks and dressing amounts to little if any more than this; but to allow for any failure of the old granite to furnish sufficient blocks for the new pavement, it is provided in the contract that the contractors shall make up any deficiency by furnishing napped and re-clipped blocks obtained elsewhere.

The contract includes 4,300 square yards laid with the blocks already on the street, an estimate of 500 square yards in which the old blocks are furnished by the contractors, and a small section of 300 square yards adjacent to the P. R. R. tracks which are being laid with new granite blocks of standard modern specifications. The contractor bid $3.42, using the old blocks napped and re-clipped, this including the removal of the old blocks and cutting them in shape for relaying, the grading of the subgrade, laying the eight-inch concrete base and relaying the blocks, including the surface of asphalt and sand. Where the same kind of pavement is laid using old blocks furnished by the contractor, the bid was $4.72, and the bid for the pavement laid with new blocks in accordance with modern specifications was $6.21. It is seen by these prices that the city pays $2.79 less per square yard for the pavement laid with the old blocks napped and re-clipped than it does for a new granite pavement.

In connection with the matter of prices, it may be stated that, in the general specifications of the city for paving of various kinds, there are what are known as standing prices, which are the prices that are paid for work done by a contractor under any contract in which bids have not been received for this particular kind of work, the purpose being in general to provide for small items of special work, probably unforeseen, that may come up during the construction. On January 17, 1918, the commissioners increased by 20 per cent these standing prices, except that the increase was 50 per cent in the case of iron manhole and basin heads.

Bids on this contract were received April 1st and the contract was awarded April 17th to the Newark Paving

Company. Under the terms of the contract the work was to be completed in ninety working days from date of the filing of the contract. At the present time the entire length of one half of the street has been entirely completed, the blocks have been removed and napped for more than half of the other side of the street, the grading has been completed over about half of the uncompleted area and concrete base laid over perhaps one-third of it. The contractor furnishes a two-year guarantee, 5 per cent of his payment being retained, 2 per cent to be paid at the end of one year and 3 per cent at the end of the second year.

### METHOD OF CONSTRUCTION.

In removing the old blocks, one man with a crowbar removes all of the blocks in each eighth course and loosens up the remainder by prying with the bar so that the stone can easily be picked up by hand. (There had originally been a tar filler between the blocks, but comparatively little of this remains and what there is has no adhesiveness.)

Following this loosening of the blocks, comes a gang of twelve men napping and clipping. These men seat themselves in a space made by lifting out a few of the loose blocks, using one block with a small cushion as a seat, and dress all the blocks near them from track to curb, moving ahead to a new position when all of the blocks up to the next stone dresser have been napped and clipped. In napping the blocks, a groove is cut quickly with hammer and chisel across the middle of one side of the block, extending between what were originally the top and bottom of the block; the block is then turned with this groove on the bottom and struck several blows on the other face directly opposite the chiseled groove, when the block breaks in two, providing two blocks with faces approximately at right angles to the original sides of the blocks. These new faces are used as the tops of two new blocks, and by means of the clipping hammer the head is shaped to an approximate rectangle.

The ends of the block are then broken off so as to give a depth of between five and five and a half inches. The specifications provide that the block shall be from three and a half to four and a half inches wide and the length not less than six inches. As the length of the new block corresponds to the depth of the old, and the latter was approximately eight inches, it is possible in most cases to obtain the six-inch length without difficulty. Where these dimensions cannot be obtained or the block breaks wrong, it is discarded. The broken pieces and chips are removed with the dirt in grading afterward to the subgrade.

Several of the dressers were timed and it was found that one man could nap and clip from five to seven new blocks in five minutes. Some of the men were apparently dressing 50 per cent more blocks than others, some averaging slightly less than five and others slightly more than seven. Allowing time for moving positions, etc., the men would apparently average about five hundred blocks a day per man.

Following the twelve stone dressers are two laborers who pile the dressed stone on the sidewalk. Following this, the subgrade is lossened by means of a rooter plow drawn by a team, and the earth is then shoveled into horse-drawn dump carts by eight laborers and a foreman. Grade for this, as for all operations, is obtained by stretching strings between the track and the curb and measuring down from the same. After the grading, the subgrade is rolled with a heavy Buffalo-pits road roller.

The base is mixed one cement, three sand and six of broken stone, a Koehring boom and bucket mixer being used. The sand and stone are piled on the finished subgrade ahead of the mixer and brought to it by wheelbarrow. The bucket holds about a half a batch and, while the writer was observing the work, the first bucket was filled after the batch had been mixed for about forty-five seconds and the second after mixing for about seventy-five seconds. About two to two and a half minutes were used for each batch. The grade of the top of the concrete is given by means of iron rods driven into the subgrade just ahead of the concrete at intervals, two such rods being spaced at uniform intervals between the track and the curb and the grade of the tops set by reference to a cord stretched between the top of the rail and the grade marked on the face of the curb. These steel rods are of course withdrawn after the concrete has been placed and surfaced.

The filler for the blocks is mixed approximately 50 per cent asphalt and 50 per cent sand. It is specified that the sand should all pass a 20-mesh screen and be heated to a temperature between 300 and 400 degrees Fahrenheit. (A Honhorst sand heater is used by this contractor for this purpose.) The asphalt cement is required to have a melting point between 130 degrees and 145 degrees Fahrenheit, at least 98½ per cent soluble in carbon tetrachloride, penetration between 60 and 100, ductility not less than 40 centimeters at the rate of five centimeters per minute, and lose not more than three per cent by volatilization when maintained at 325 degrees Fahrenheit for five hours. The material being used on this work is Texaco 65 paving cement. The filler must be applied over the entire area of each day's work before work is stopped for the night, the joints being protected by tarpaulin or other means in case work is interfered with by rain.

The asphalt and sand mixture is brought from the melting kettle to the streets in wheel-barrows and is poured into the joints by use of coal scuttles the nozzles of which have been flattened to a width of three or four inches. Sufficient surplus of the material is poured on the pavement to cover it about one-eighth of an inch thick and the whole area is then covered with a generous application of sand, a part of which is undoubtedly pressed into the asphalt by the traffic, which is at once allowed on the streets.

The stretch of this pavement which has been completed and in service for about two weeks gives almost as smooth riding as a sheet asphalt pavement—smoother, certainly, than a good granite block pavement constructed by modern specifications.

Before the laying of the pavement, the contractor removed the old curb and replaced it with granite curb. This new curbing, of which there were 2,200 lineal feet, is six inches wide on the top and twenty inches deep, the exposed face and top being four-cut and the curb being set in a bed of concrete twelve inches wide and six inches deep under the curb, at least six inches thick behind the curb and extending twelve inches up from the bottom of it. For this new curb the contractor receives $1.67 per lineal foot, and $1.97 for curb at the street corners which are laid to a radius of from ten feet to fifteen feet, depending upon the width of sidewalk.

In resetting the curbing, the sidewalk along the curb is of course more or less broken. (This being a business street, the sidewalk pavement is carried to the curb at all points.) The engineers pride themselves upon the prompt replacing of these sidewalks, the contractor being required to immediately replace the sidewalk as soon as the curb has been set. The sidewalk is replaced with the same kind of material originally used, in some places cement and in others flagstone. The estimated amount of sidewalk to be replaced in this contract included 4,000 square feet of cement sidewalk five inches thick, the price for which was 21 cents; 1,000 square feet of bluestone flagging four feet wide, for which the price was 21 cents, including cement joints; 500 square feet of new bluestone flagging five feet wide at 24 cents; while it is estimated that 4,000 square feet of the old flagging can be relaid, the price for this relaying, with cement joints, being 5 cents a square foot. All of the sidewalk which has been destroyed by the replacing of curbing had been restored at the time of the writer's visit a few days ago.

Newark has for some time been employing a method of treating old stone-block that suggests the asphalt surfacing just described. Many of these old pavements, laid without any concrete foundation, settle in small areas, frequently only two to a half-dozen blocks settling an inch or two. To remove these blocks and relay them is expensive, and removing the blocks without breaking any is difficult. In such cases the city, by its asphalt repair gang, fills in the depression level with the surrounding pavement with the same material used as the wearing surface for sheet asphalt pavements. A great many of these patches were seen and ridden over by the writer and seemed to be holding their place and surface well and to be quite satisfactory except for appearance. They are not a permanent construction, but keep a heavily traveled pavement passable until such time as a new one can be substituted for it.

# CURING CONCRETE

### Results of Tests Made to Determine Effect of Curing Conditions on Strength of Concrete and Wear from Abrasion—Results Much Better When Concrete Kept Damp for Several Days.

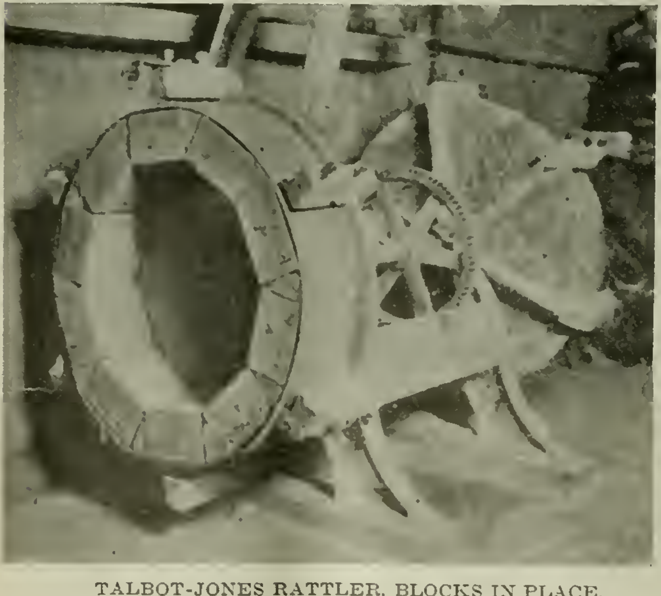
In the research laboratory conducted through the cooperation of Lewis Institute of Chicago and the Portland Cement Association, tests have been conducted during the past year or two on the effect which curing and the conditions under which the curing is effected have upon the strength and wear of concrete. These were conducted under the direction of Professor Duff A. Abrams, who described the tests and the conclusions therefrom in a paper before the American Railway Engineering Association.

Without going into details in describing the tests themselves, it may be said that the aggregates used in most cases were sand and pebbles, crushed limestone replacing the latter in one group of tests; the mixture being one volume of cement to four volumes of mixed aggregate. The concrete was mixed to six different consistencies as determined by the "slump" in a 6 x 12-inch cylinder upon removing the metal form. There were also four different conditions of curing, one set being stored in damp sand during the entire four months elapsing before testing, others being left in damp sand 21 days and in air 99 days, a third set being stored in damp sand for three days and air for 117 days, and the fourth being left in the air of the laboratory for the entire four months.

Pieces for compression tests were in the form of 6x12 cylinders and those for wear tests in blocks eight inches square and five inches thick. The compression tests were made in a 200,000 pound Olsen testing machine and the wear tests in a Talbot-Jones rattler.

In making the wear test, ten blocks were arranged around the perimeter of the drum and an abrasive charge used consisting of two hundred pounds of cast iron balls, ten being 3¾ inches in diameter and about 133 being 1⅞ inches. The rattler made 1,800 revolutions at the rate of 30 revolutions per minute, 900 revolutions being run in one direction and then 900 in the other. The loss in weight of each block during the test was considered the measure of its wear and was reduced to an equivalent depth of wear in inches.

While the Talbot-Jones rattler was designed many years ago, it has not been used to any wide extent, and the ordinary rattler of standard dimensions and construction has been almost universally employed for testing brick and other blocks employed in paving. Its use in these tests was considered to be entirely successful and the results have given those in charge of the laboratory considerable confidence in this method of testing. They consider that this rattler gives a wearing action



TALBOT-JONES RATTLER, BLOCKS IN PLACE.

RATTLER CLOSED, READY FOR TEST.

suited for a wide range in the properties of concrete. A very poor concrete may be entirely destroyed, while a high-grade concrete shows a wear of one-half inch or less. It gives a combination of abrasion and impact that cannot be withstood by an inferior concrete. While the test does not fully duplicate the action of traffic, it furnishes a valuable guide to the relative effects of different methods of treatment, materials, etc., for use in pavement construction.

This method of making wear tests of concrete is believed to have the following advantages as compared with other methods that have been used or proposed for this purpose:

(1) The concrete is subjected to a treatment which approximates that of service.

(2) The test piece is of usual form and of sufficient size that representative concrete can be obtained.

(3) The test pieces are convenient to make, store and handle, and require a relatively small quantity of concrete.

(4) The cost of tests is not excessive.

(5) The machine used is found in a number of testing laboratories.

(6) The wearing action takes place on the top or finished surface of the concrete. This makes it possible to study the effect of various surface treatments and finishes.

(7) Several tests may be made at the same time, thus enabling more representative results to be obtained.

(8) Tests may be made on sections of concrete cut from roads which have been in service.

(9) Other paving materials, such as brick, granite blocks, etc., may be tested in the same manner as the concrete.

*Effect of Consistency.*—The consistency which gave a slump of between one-half inch and one inch was assumed to be normal, and the use of 90 per cent as much water was termed 90 per cent consistency, and the use of 50 per cent more water (which made a quite wet concrete) was called 1.50 consistency. With a consistency of 1.25, the strength was found to be about 75 per cent, and with a consistency of 1.50 the strength was only one-half of the maximum obtainable. With 90 per cent consistency the strength was slightly less in most cases than with normal consistency. However, in concrete road work where hand finishing is employed, the consistency must generally vary between 1.10 and 1.15 in order to secure a workable mix. If machine finishing is employed, however, the concrete can be mixed to a consistency corresponding closely to maximum strength.

In comparing blocks of different consistencies, the amount of wear was found to vary almost exactly inversely as the strength. The depth of wear at 1.00 consistency was found to be about .63 inch, while at a consistency of 1.50 the wear was about 1.20 inches.

*Effect of Curing Conditions.*—All consistencies of concrete showed a great increase in strength under favorable curing conditions as compared with specimens which were allowed to dry out at once. Even three days in damp sand increased the strength of the dryer concrete, while concrete stored for four months in damp sand was two and a half to three times as strong as similar concrete which had been exposed to room atmosphere for the same period. Protecting the concrete from drying out for only ten days increased the strength about 75 per cent.

As to the effect of curing on wear, the dryer mixes showed an increase in wear from 0.5 inch for concrete stored in damp sand for twenty-one days, to 1.1 inch for concrete in air for the entire period. For the wetter mixes, the wear of those that had been twenty-one days in damp sand was about 0.85 inch, of those that had been ten days in damp sand 1.15 inch, and after continuous air storage the wear was about two inches.

Blocks stored for the entire period of four months in damp sand showed more wear in most instances than those which had been stored for twenty-one days in damp sand and the remainder of the time in air. This was believed to be due to the fact that in the former case the concrete was tested in a damp condition, it being a matter of common experience that non-metallic materials, such as timber, terra cotta, concrete, stone, etc., which absorb water show a lower strength in a wet condition than when dry. Additional tests will be required to show the effect of moisture content on strength and wear of concrete, other factors being the same.

The experiments indicated that a definite relation existed between strength and wear for different consistencies and curing conditions. Further tests will be necessary to show whether this relation is general for other aggregates when used in these tests. Prof. Abrams gives the formula, $S = \frac{2230}{W^{1.07}}$, in which S is the compressive strength in pounds per square inch and W is the depth of wear in inches. An earlier series of tests, in which the samples were tested after two months, has given results from which were derived the formula $S = \frac{1800}{W^{1.3}}$.

The author says: "In view of the important influence of consistency and curing conditions of concrete shown by these tests, it seems doubtful if there is any phase of concrete work which will pay such high dividends as a little care to see that proper consistency is used and desirable curing conditions are provided."

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# PUBLIC CO-OPERATION IN REFUSE COLLECTION.

### Duties and Responsibilities of Householders Not Realized by Them—Should Separate Refuse and Provide Suitable Receptacles in Accessible Places.

In its report upon the refuse collection work done by the Department of Public Works of Rochester, N. Y., the Bureau of Municipal Research made many recommendations for improvements in the service rendered by the department; but in the concluding part of its report it says: "Perhaps the most important thing to accomplish is to obtain better and more intelligent co-operation between the public and the department. It is believed that as good service will be given as the public deserves and demands. To demand is not enough, however—the public must deserve good service by co-operaing with the department in every possible way. Proper separation of refuse into the three desired classes and provision of adequate and more or less standard containers alone would do much to improve the quality of service possible to render; but the necessity for a mutual understanding of the entire problem is great. The duties and responsibilities of the department are fairly well known, but the public itself has duties and responsibilities fully as essential to satisfactory collection service which perhaps are not so well understood.

"The duties of the department are to remove refuse from the premises to the curb, to load it onto collection vehicles, and to transport it to the place of final disposition, all with as little nuisance and inconvenience as possible to the public. These duties imply:

(1) That the work shall be done at convenient hours and with regularity and sufficient frequency;

(2) That there shall be no destruction of property nor damage done to premises entered;

(3) That refuse shall not be scattered through the premises nor on the street;

(4) That the vehicles used in transportation shall not leak or otherwise result in nusiance;

(5) That the forces engaged in the work shall be courteous and as obliging as possible at all times.

"The duties and responsibilities of householders may be summarized briefly as follows:

(1) To provide suitable receptacles for all refuse;

(2) To separate all refuse carefully into the classes required by ordinance and necessary for its proper disposal;

(3) To store refuse in easily accessible places under sanitary conditions;

(4) To inform themselves of the requirements and to observe carefully all ordinances relating to the separation, storage and collection of refuse;

(5) To co-operate sympathetically with the collection forces by recognizing the difficulties under which the work is done, by confining complaints to legitimate causes, and by making intelligent suggestions toward the improvement of conditions and work methods.

"In all frankness it must be stated that the department comes much nearer to fulfilling its obligations to the public than the public does to conforming to the requirements made of it."

A general investigation or canvass was made of the ash receptacles used throughout the city, and 96,971 such receptacles were noted on the lists. Of this number, 34.1 per cent were galvanized iron cans, 21.25 per cent were sugar and salt barrels, 13.8 per cent were flour and apple barrels, 7.63 per cent were wash tubs, 5.9 per cent were egg crates, soap boxes, etc., 4 per cent were bushel baskets, and the remainder comprised fish barrels, large packing boxes, 50-gallon casks cut in two, butter tubs, pails and buckets with handles, wash boilers, market baskets and other miscellaneous receptacles.

Some of these receptacles were so dilapidated that their contents could not be emptied into the wagon without spilling, others were so large that their weight made it impossible to empty them and their contents were dumped on the streets and shoveled into the wagon. It was shown by timing that it cost five times as much to shovel a can of refuse from the ground as to dump it into the wagon. A greater part of the barrels were minus hoops and even parts of the sides and bottoms. A number of calcium chloride cans had dangerously sharp edges along their tops by which the hands of many of the collectors were cut and torn. The only receptacles that could be considered proper were the 34 per cent. of galvanized iron cans, and most of these were found in pubic schools, fire houses and other public buildings, in the down-town business district where they are required by law, and on a few streets in the better residential sections. All of the other receptacles are difficult to handle, causing loss of time of the collectors and unjustifiable tax upon their strength and spilling of the dirt upon the street so that it is impossible to avoid littering the street in emptying them, while many of the smaller ones were found already heaped up and overflowing, with their intended contents already scattered about over a considerable area.

Answering the argument that might be offered that the furnishing of proper receptacles for ashes and rubbish would add more to the expense of the householders than would be saved in the collection service, the report states that this is not the case, but that proper receptacles if taken care of would last several seasons and their cost per year to the householder would be very small, whereas the amount which their use adds to his taxes in order to cover delay in collection and added work for the street cleaners is a very appreciable item. Not the least objection to the indiscriminate use of all kinds of containers is the fire hazard. The use of these miscellaneous wooden receptacles for ashes has been proved to be the cause of fires in many cases and probably has been the cause of others, many of them serious.

In addition to furnishing these improper receptacles, the householders add to the difficulty and delay of collection by failing to shovel snow from the walks leading to the points where the receptacles are stored. This makes it difficult and sometimes almost impossible to truck or otherwise remove to the collecting wagon, through a foot or more of snow, barrels of ashes weighing from one to three hundred pounds.

Another source of additional expense is the failure of the householder to put out the ash or rubbish receptacle before the collecting wagon arrives, and his calling up the office complaining that the material had not been collected and demanding that a wagon be sent for it. It was admitted that in Rochester a part of this was undoubtedly due to the failure of the department to make and observe a regular schedule of times for calling for ashes and rubbish.

Another way in which the public interfered with the operation of collection was the placing of receptacles where they would be buried in snow or frozen in ice so that it was impossible for the collectors to remove them.

Complaint was made that many householders, and especially the proprietors of hotels and restaurants, give their garbage to private collectors, in direct violation of the law. These private collectors take only the best and fattest garbage, leaving the low-grade garbage for the city to collect. In 1917 it was estimated that fully 40 per cent of the garbage was collected by these private scavengers. Whether the garbage is used for hog feeding or in a reduction plant, this practice means a loss of revenue to the city; and whether the garbage is utilized or

FIFTY-GALLON CASKS FILLED TO THE TOP WITH GARBAGE, WHICH ONE MAN HAS TO EMPTY.

DAMAGED AND UNSUITABLE RECEPTACLES MAKE THE WORK OF THE COLLECTORS DIFFICULT.

not, a nuisance is almost sure to be created by the use by the private collectors of leaky tanks or wagons and other careless appliances and methods in making the collections.

Another point considered in the report, while it does not directly affect the collection of refuse, is an important one from the viewpoint of the public good, this being the objection to allowing rubbish to accumulate on premises because of the fire danger with certain classes of rubbish, odors and other unsanitary conditions occasioned by other classes, and the general public nuisance occasioned by the unsightly yards and vacant lots that result from such accumulation.

It is recommended that the following procedure be followed in an effort to bring about a better understanding by the public of the problem of refuse collection and its co-operation with the collectors.

(1) All laws, ordinances and rules relating to the separation, storage, collection and disposal of refuse and to the work of street and sidewalk cleaning should be revised and combined in a sanitary code. This code should be printed and distributed among all householders and property owners as well as members of the sanitary forces, the police and other interested persons.

(2) A section should be added to this code to include definitions of all terms and a complete classification of refuse.

(3) Provision should be made for enforcing the provisions of the sanitary code. For this purpose it is believed all officers of the proposed Bureau of Sanitation should be empowered by law to issue warnings and to serve summonses for violations of the code.

(4) A comprehensive campaign for the education of the public as to its duties, responsibilities and rights, and as to the reasons for each, should be undertaken. This is essential, since without hearty public co-operation existing undesirable conditions cannot be corrected. It means, in effect, that the department must take the public into its confidence and explain the motive back of its regulations. To accomplish the desired result all available means of publicity should be used, including newspapers, schools, local welfare and improvement societies, etc.

"Good municipal housekeeping and civic cleanliness demand that the safety, welfare and convenience of the many shall not be impaired by the carelessness or slovenliness of the few. There is no reason why the majority should be inconvenienced and even the general safety of the whole city endangered by a few persons. If such offenders do not have any sense of civic pride or cleanliness, they should be *required* to maintain a proper observance of the laws of decency and regard for the rights of others." Ordinarily there are ordinances calculated to secure the observance by all citizens of the regulations relative to refuse collection; and the department should enlist the influence of the majority in requiring the officials to enforce the rules.

## TYPHOID AND WATER DISINFECTION IN MARYLAND.

### Effect of Use of Chlorine in Eighteen Supplies, as Indicated by Typhoid Cases and Deaths Before and After.

In the issue of June 7th we published a discussion, by Robert B. Morse and Harry R. Hall, chief engineer and assistant engineer respectively of the Maryland Department of Health, of the use of chlorine in disinfecting the public water supplies of that state. In the following issue we published tabulated data showing the typhoid death rates in 82 cities of the country for a few years before and after the use of chlorine was begun. Through an oversight we omitted from this tabulation data concerning Maryland municipalities which had been furnished by Mr. Morse but had been mislaid in handling the hundreds of returns that were then passing through this office. This information is given herewith both in the form prepared by Mr. Morse and rearranged to correspond with the tabulation in the June 14th issue.

**Typhoid Fever Cases and Deaths in Towns in Maryland Having Disinfection Plants.**

| Name of City | 1910 | 1911 | 1912 | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 |
|---|---|---|---|---|---|---|---|---|---|
| Annapolis | 14 | 9 | 12 | 12 | 12 | *17 | 6 | 8 | 2 |
| | 5 | 2 | 3 | 3 | 2 | 4 | 2 | 0 | 0 |
| Baltimore | 1,891 | 1,201 | 1,083 | 1,163 | 757 | *949 | 806 | 566 | 332 |
| | 235 | 154 | 136 | 135 | 130 | 122 | 104 | 92 | 74 |
| Braddock Hghts. | 0 | 4 | 1 | 0 | 0 | 1 | 0 | 0 | *0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cumberland | 567 | 308 | 190 | *450 | 68 | 76 | 57 | 50 | 12 |
| | 35 | 23 | 17 | 37 | 17 | 9 | 14 | 8 | 5 |
| Elkton | 21 | 14 | 23 | 10 | 5 | 11 | 7 | *7 | 3 |
| | 2 | 3 | 7 | 1 | 0 | 3 | 2 | 2 | 0 |
| Frederick | 39 | 60 | 53 | 22 | 25 | *14 | 20 | 16 | 8 |
| | 8 | 6 | 5 | 7 | 3 | 0 | 6 | 1 | 0 |
| Frostburg | 10 | 42 | 17 | 6 | 3 | 10 | *12 | 7 | 1 |
| | 3 | 5 | 2 | 1 | 3 | 1 | 2 | 0 | 0 |
| Hagerstown | 44 | 41 | 38 | *112 | *32 | 108 | 53 | 55 | 26 |
| | 3 | 4 | 6 | 4 | 4 | 12 | 6 | 14 | 0 |
| Kensington | 0 | 2 | 0 | 0 | 0 | 1 | 1 | 0 | *0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Laurel | 12 | 12 | 6 | 10 | 8 | *7 | 6 | 4 | 4 |
| | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| Luke | 0 | 1 | 0 | 3 | 5 | 18 | 3 | 5 | *3 |
| | 2 | 0 | 1 | 1 | 1 | 2 | 1 | 0 | 0 |
| Princess Anne | 8 | 1 | 2 | 5 | 10 | 4 | 17 | *2 | 7 |
| | 0 | 3 | 1 | 0 | 0 | 0 | 2 | 0 | 1 |
| Rockville | 18 | 9 | 3 | 3 | †34 | 1 | *3 | 2 | 0 |
| | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| Salisbury | 77 | 81 | 22 | 53 | 41 | 46 | 45 | *27 | 13 |
| | 7 | 13 | 11 | 10 | 4 | 3 | 12 | 0 | 0 |
| Takoma Park | 0 | 0 | 2 | 8 | 0 | 0 | 2 | 1 | * |
| | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | .. |
| Union Bridge | 15 | 17 | 7 | 10 | *2 | 5 | 1 | 7 | 2 |
| | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Westernport | 0 | 0 | 42 | 62 | *134 | 66 | 33 | 5 | 3 |
| | 0 | 0 | 0 | 2 | 7 | 4 | 0 | 1 | 0 |
| Westminster | 0 | 22 | 13 | 9 | 3 | 3 | 6 | 2 | *6 |
| | 2 | 2 | 0 | 1 | 1 | 1 | 0 | 0 | 0 |

Note.—Upper figures give cases, lower deaths. Star (*) indicates year disinfection plant was installed. Dagger (†) indicates temporary hypo. plant installed.

**Use of Chlorine for Water Supplies in Maryland Municipalities.**

| City | Population | | Began use of chlorine | Other treatment | Deaths from Typhoid | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Years Before Use of Chlorine | | | | | Years After Use of Chlorine | | | | |
| | 1910 | 1918 | | | 5 | 4 | 8 | 2 | 1 | 1 | 2 | 3 | 4 | 5 |
| Annapolis | ...... | 8,677 | 1915 | None | 5 | 2 | 3 | 3 | 2 | 2 | 0 | 0 | .. | .. |
| Baltimore | ...... | 599,650 | 1915 | Filtration | 235 | 154 | 136 | 135 | 130 | 104 | 92 | 74 | .. | .. |
| Braddock Heights | ...... | 175 | 1918 | None | 0 | 0 | 0 | 0 | 0 | .. | .. | .. | .. | .. |
| Cumberland | ...... | 26,074 | 1913 | Filtration | .. | .. | 35 | 23 | 17 | 17 | 9 | 14 | 8 | 5 |
| Elkton | ...... | 2,442 | 1917 | None | 7 | 1 | 0 | 3 | 2 | 0 | .. | .. | .. | .. |
| Frederick | ...... | 11,340 | 1915 | None | 8 | 6 | 5 | 7 | 3 | 6 | 1 | 0 | .. | .. |
| Frostburg | ...... | 6,655 | 1916 | None | 5 | 2 | 1 | 3 | 1 | 0 | 0 | .. | .. | .. |
| Hagerstown | ...... | 27,000 | 1914 | None | .. | .. | 3 | 4 | 6 | 12 | 6 | 14 | 0 | .. |
| Kensington | ...... | 865 | 1918 | None | 0 | 0 | 0 | 0 | 0 | .. | .. | .. | .. | .. |
| Laurel | ...... | 2,692 | 1915 | Filtration | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | .. | .. |
| Luke | ...... | 950 | 1918 | Filtration | 1 | 1 | 2 | 1 | 0 | .. | .. | .. | .. | .. |
| Princess Anne | ...... | 1,133 | 1917 | None | 1 | 0 | 0 | 0 | 2 | 1 | .. | .. | .. | .. |
| Rockville | ...... | 1,239 | 1914 | None | .. | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | .. |
| Salisbury | ...... | 8,696 | 1917 | None | 10 | 10 | 4 | 3 | 12 | 0 | .. | .. | .. | .. |
| Takoma Park | ...... | 1,646 | 1918 | Filtration | 1 | 0 | 0 | 0 | 0 | .. | .. | .. | .. | .. |
| Union Bridge | ...... | 918 | 1914 | None | .. | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | .. |
| Westernport | ...... | 3,288 | 1914 | None | .. | 0 | 0 | 0 | 2 | 4 | 0 | 1 | 0 | .. |
| Westminster | ...... | 3,374 | 1918 | Filtration | 1 | 1 | 1 | 0 | 0 | .. | .. | .. | .. | .. |

# WATER RATES AND FIRE PROTECTION CHARGES

## Data from Several Hundred Cities of the United States—Maximum and Minimum Rates—Changes Since Before the War—Receipts for Public Hydrants and Private Fire Protection.

In connection with the information concerning water works matters which was published in our issue of June 7, we obtained through questionnaires information concerning the rates charged by the several cities for water sold by meter, the amounts of consumption limiting the maximum and minimum rates, changes in rates caused by war conditions, fire hydrant rentals, and charges for private hydrants and sprinklers used for fire protection. The tabulation of these data occupied so much space that we could not find room for it in that issue, and are giving the first installment in this issue, others to follow in succession.

The rates are based on the hundred cubic feet in some cities and the thousand gallons in others; the former

### METER RATES AND FIRE PROTECTION.

| City and State. | Municipal or Private. | Maximum Meter Rates. | | Minimum Meter Rates. |
|---|---|---|---|---|
| | | Rate. | For consumption less than | |
| **Alabama:** | | | | |
| Gadsden | Municipal | 25c. per 100 cu. ft. | ........ | 4c. per 100 cu. ft. |
| Talladega | Municipal | 25c. per M | 5,001 gals. | 6c. per 1,000 gal. |
| **Arizona:** | | | | |
| Clifton | Private | $1 per M | 1,000 gals. | 13½c. per M |
| **Arkansas:** | | | | |
| Fayetteville | Municipal | $1 per M | ........ | 35c. per M |
| **California:** | | | | |
| Alhambra | Municipal | $1 per 100 cu. ft. | 800 cu. ft. | 5c. per 100 cu. ft. |
| Anaheim | Municipal | $1 | 7,500 gals. | 10c. per 750 gal. |
| Lodi | ........ | 15c. per M | ........ | 5c. per M |
| Los Angeles | Municipal | 7c. per 100 cu. ft. | 10,000 cu. ft. | 5c. per 100 cu. ft. |
| Oxnard | Municipal | 20c. per 100 cu. ft. | 501 cu. ft. | 7c. per 100 cu. ft. |
| Palo Alto | Municipal | 12c. per M | ........ | 12c. per M |
| Pasadena | Municipal | 10c. per 100 cu. ft. | 1,001 cu. ft. | 8c. per 100 cu. ft. |
| Riverside | Municipal | 30c. per 100 cu. ft. | 301 cu. ft. | 6c. per 100 cu. ft. |
| Sacramento | Municipal | ........ | ........ | ........ |
| San Diego | Municipal | $1.00 per 100 cu. ft. | ........ | 8c. per 100 cu. ft. |
| Santa Maria | Municipal | 30c. per M | 5,001 gals. | 8c. per M |
| South Pasadena | Private systems | 9½c. per 100 cu. ft. | 1,301 cu. ft. | 7c. per 100 cu. ft. |
| | | 10c. per 100 cu. ft. | 1,001 cu. ft. | 7c. per 100 cu. ft. |
| Stockton | Private | 25c. | 10,000 cu. ft. | 10c. |
| **Colorado:** | | | | |
| Colorado Springs | Municipal | 15c. per M | 10,000 gals. | 8c. per M |
| Fort Morgan | Municipal | 25c. per M | 5,001 gals. | 5c. per M |
| Greeley | Municipal | 15c. per M | 1,001 gals. | 7c. per M |
| Rocky Ford | ........ | $1.50 per M | 500 gals. | 10c. per M |
| **District of Columbia:** | | | | |
| Washington | Municipal | $4.50 per year | 7,501 cu. ft. | 4c. per 100 cu. ft. |
| **Connecticut:** | | | | |
| Ansonia | Private | 18c. per 100 cu. ft. | 10,000 cu. ft. | 4c. per 100 cu. ft. |
| East Hartford | Municipal | 30c. | 500 | 15c. |
| Hartford | Municipal | 16c. per M | 22,000 gals. | 8c. per M |
| Middletown | Municipal | 12c. per 100 cu. ft. | 20,000 cu. ft. | 5c. per cu. ft. |
| Putnam | Municipal | 20c. per M | 1,001 gals. | 10c. per M |
| Southington | Municipal | 25c. per 100 cu. ft. | 1,001 cu. ft. | 4c. per 100 cu. ft. |
| South Norwalk | Municipal | (d) | ........ | ........ |
| Suffield | Private | 35c. per 100 cu. ft. | 25,000 cu. ft. | $2.50 per quarter |
| South Manchester | Private | 20c. per 100 cu. ft. | 10,000 cu. ft. | 10c. per 100 cu. ft. |
| Wallingford | Municipal | 20c. per M | 15,000 cu. ft. | 4⅔c. per M |
| Willimantic | Municipal | 25c. | 14,196 | ........ |
| **Florida:** | | | | |
| De Land | Municipal | $4 per quarter | 10,001 | ........ |
| Fort Myers | Municipal | 33⅓c. per M | 3,001 gals. | 15c. per M |
| Miami | Private | 16c. per 100 cu. ft. | 9,000 cu. ft. | 6c. per 100 cu. ft. |
| Ocala | Municipal | 12½c. per 100 cu. ft. | ........ | $1.25 per month |
| St. Augustine | Municipal | $3 | 270,000 cu. ft. | Sliding scale per 100 cu. ft. |
| St. Petersburg | Municipal | 18c. per M | ........ | 12c. per M for sprinkling lawn (separate meter) |
| **Georgia:** | | | | |
| Albany | Municipal | 20c. per cu. ft. | 30,000 cu. ft. | 10c. per cu. ft. |
| Americus | Municipal | 20c. per M | Domestic | 15c. per M |
| Atlanta | Municipal | 12c. per M | 6,001 gals. per month | 8.4c. per M |
| Commerce | Municipal | 25c. per M | 25,000 gals. | 10c. |
| Elberton | Municipal | 20c. per M | 5,000 gals. | ........ |
| Fitzgerald | Municipal | 30c. per M | 10,000 gals. | 15c. per M |
| La Grange | Municipal | 30c. | 3,301 | 10c. |
| Marietta | Municipal | 21c. per M | 10,000 gals. | 13.13c. per M |
| Savannah | Municipal | 9c. per 100 cu. ft. | 10,001 cu. ft. | 4½c. per 100 cu. ft. |
| Tifton | Municipal | 60c. per M | 2,000 gals. | 7c. per M |
| **Idaho:** | | | | |
| Coeur d'Alene | Private | 40c. per M | 5,000 | 10c. per M |
| Lewiston | Municipal | 17c. per 100 cu. ft. | 701 cu. ft. | 6c. per 100 cu. ft. |
| Twin Falls | Municipal | ........ | ........ | $1 |
| **Illinois:** | | | | |
| Cairo | Private | 27 net | 10,000 | 6.3 net |
| Canton | Municipal | 40c. per M | 1,001 | 32c. per M |
| Champaign & Urbana | Private | 25c. + 15% | 5,000 per quarter | 12.5c. + 15% |
| Chicago | Municipal | 6.25c. per 100 cu. ft. | 1,001 cu. ft. | ........ |
| Chicago Heights | Municipal | 18c. | 1,301 cu. ft. | 5c. |
| De Kalb | Municipal | 40c. per M | 5,001 | 10c. per M |
| Downer's Grove | Municipal | 50c. per M | 2,501 | 14c. per M |
| Duquoin | Private | 25c. | 1,001 | 7c. |
| Kankakee | Private | 31c. per M monthly | 12,001 | 13c. per M |
| Lincoln | ........ | ........ | ........ | ........ |
| Mattoon | Municipal | 40c. | 4,500 | 6c. |
| Mount Carmel | Private | 25c. | 100,000 | 10c. |
| Mount Vernon | Private | 30c. per M | 10,000 | 7c. per M |
| Olney | Municipal | 29c. per M monthly | 2,410 | 12c. per M |
| Paris | Municipal | 25c. per M quarterly | 30,001 | 6c. per M |
| Peru | Municipal | 25c. per M | 18,000 | $3 per year |
| Princeton | Municipal | $1 per 100 cu. ft. | 51 cu. ft. | 25c. per 100 cu. ft. |
| Quincy | Municipal | ........ | ........ | ........ |
| Streator | ........ | 16c. per 100 cu. ft. | ........ | 7c. per 100 cu. ft. |
| Watseka | ........ | 25c. per M | 100,000 | ........ |

*(To be continued)*

## METER RATES AND FIRE PROTECTION.

| City and State. | Minimum Meter Rates For consumption more than | Increase since before the war. | City pays for fire hydrants. | Charge for private hydrants or sprinklers. |
|---|---|---|---|---|
| **Alabama:** | | | | |
| Gadsden | ........ | None | $40 each per year | Have none |
| Talladega | 115,000 gals. | None | $7.92 each per quarter | $9 per hydrant, allowance free, 18,000 gal. |
| **Arizona:** | | | | |
| Clifton | 100,000 gals. | None | $2.50 per month | $2.50 per month |
| **Arkansas:** | | | | |
| Fayetteville | ........ | 20% | None | None |
| **California:** | | | | |
| Alhambra | For irrigation | None; fire hydrant rental proposed | $1.50 each per month | Fire hydrants $1.50; sprinklers $1 each inch diameter of pipe |
| Anaheim | 7,500 gals. | ........ | $5 each | Water through meter |
| Lodi | ........ | None | $6 per year | None |
| Los Angeles | 50,000 cu. ft. | None | Nothing | $1—2", $1.50—3", $2—4", $4—6" |
| Oxnard | 11,000 cu. ft. | ........ | Nothing | None |
| Palo Alto | ........ | None | $1.50 each per month | None |
| Pasadena | 1,000 cu. ft. | None | 75c. each on 8" mains or larger | $1 per month if separate from domestic service |
| Riverside | 3,000 cu. ft. | None | $500 per month | $1 per month |
| Sacramento | ........ | None | Nothing | $5 for sprinklers |
| San Diego | ........ | None | Nothing | $1 per month |
| Santa Maria | 25,000 gals. | Have reduced | $12 each per year | None |
| South Pasadena | 1,300 cu. ft. | ........ | 25c. each per month | ........ |
| | 1,000 cu. ft. | ........ | ........ | ........ |
| Stockton | 50,000 | None | $1 per month; city owns hydrants | Sprinkler systems metered |
| **Colorado:** | | | | |
| Colorado Springs | 50,000 gals. | None | Nothing | None |
| Fort Morgan | 100,000 gals. | None | $40 | $8 for sprinklers per season |
| Greeley | 100,000 gals. | None | $40 each | None |
| Rocky Ford | 10,000 gals. | None | Nothing | None |
| **District of Columbia:** | | | | |
| Washington | 7,500 cu. ft. | None | Nothing | None |
| **Connecticut:** | | | | |
| Ansonia | 400,000 cu. ft. | Minimum rate raised from 3c. to 4c. per 100 cu. ft. | $25 each per year | (a) |
| East Hartford | 5,000 | None | $30 to $150 per year | $30 to $150 per year |
| Hartford | 22,000 gals. | None | $3.50 each for upkeep | None |
| Middletown | 150,000 cu. ft. | None | ........ | Based on insurance value of property |
| Putnam | 20,000 gals. | None | City pays for all water used | Hydrants $30 per year; sprinklers $1 per 1,000 sq. ft. |
| Southington | 100,000 cu. ft. | Minimum rate too low, should be raised | $18 per hydrant | $18 per hydrant; $1 each for sprinklers |
| South Norwalk | ........ | None | Nothing | None |
| Suffield | ........ | None | $30 per year | $30 |
| South Manchester | 10,000 cu. ft. | None | No charge | Installed at expense of protected party—no rental |
| Wallingford | 800,000 cu. ft. | None | No charge | None, providing factory pays reasonable rate |
| Willimantic | ........ | None | No charge | None |
| **Florida:** | | | | |
| De Land | ........ | $1 per quarter | ........ | Regular rates |
| Fort Myers | 11,000 gals. | None | Nothing | None |
| Miami | 540,000 cu. ft. | None | Nothing | $25 per year |
| Ocala | ........ | 25% | $30 each | 12½c. per 100 cu. ft. |
| St. Augustine | 270,000 cu. ft. | None | Credit 145 @ $45 per year | None |
| St. Petersburg | ........ | 10% decrease | Nothing | None |
| **Georgia:** | | | | |
| Albany | 30,000 cu. ft. | None | Nothing | None |
| Americus | Manufacturers | 2 consumers from 11½c. to 15c. | $40 each per year credit | $10 inside, $25 outside hydrants; no charge for sprinkler system |
| Atlanta | 75,000 gals. per month | 20% | $25 each per year credit | $1 for 3" connections, $1.50 for 4", $2 for 6", $3 for 8", collected monthly |
| Commerce | 100,000 gals. | None, but proposed | ........ | Furnished free to exclusive users of city water |
| Elberton | ........ | None | Nothing | None |
| Fitzgerald | 75,000 gals. | Minimum 33⅓% | Nothing | None |
| La Grange | 1,000,000 gals. | 20% | $30 per month credit | Hydrants $30 per year |
| Marietta | 100,000 gals. | None | Nothing | None |
| Savannah | 100,000 gals. | None | ........ | $16 for 2", $24 for 3", $32 for 4", $48 for 6" & 8" |
| Tifton | 1,000,000 gals. | 20% | Nothing | None |
| **Idaho:** | | | | |
| Coeur d'Alene | 1,100,000 | None | Free to city | $5 per month for hydrants |
| Lewiston | 31,300 cu. ft. | None, but might decrease | $5 each per month | None |
| Twin Falls | ........ | None | $2 each per month | No private hydrants |
| **Illinois:** | | | | |
| Cairo | 300,000 | About 20% | $35 each | Same as city |
| Canton | 75,000 | ........ | Nothing | None |
| Champaign & Urbana | ........ | 15% and 15% more asked for | $35 each | Same as public |
| Chicago | ........ | None | Nothing | None |
| Chicago Heights | 66,700 cu. ft. | Minimum rate 4c. to 5c. | Nothing | None |
| De Kalb | 12,000 | None | $25 each | None |
| Downer's Grove | 50,000 | None, but increase proposed | Nothing | None |
| Duquoin | 1,200,000 | None, but increase proposd | $256.67 per month | None for private hydrants; sprinkling by the foot |
| Kankakee | 120,000 | 25% with 10% off for cash | $40 per year | (b) |
| Lincoln | ........ | 1c. per 100 cu. ft. | $5 each service charge | $50 each for fire hydrants |
| Mattoon | 5,000,000 | 10% | No hydrants | ........ |
| Mount Carmel | 100,000 | Pending, have asked 25% | $45 | Have none |
| Mount Vernon | 100,000 | 25% | $6,000 per year | Have no rate |
| Olney | 1,000,000 | ........ | Nothing | Meter rate |
| Paris | 500,000 | None | ........ | $6 per year for sprinkling and hydrant service |
| Peru | ........ | None | $3,000 for 110 per year | None |
| Princeton | 50 cu. ft. | Removal of cash discount of 10% | Nothing | Have none |
| Quincy | ........ | None | No payment made, but figured 200 at $45, 50 at $30 and balance at $20 per year. | ........ |
| Streator | ........ | Proposed | $11,000 per year for 280 | Hydrants, $45; sprinkler heads, 3c |
| Watseka | ........ | None | Nothing | On meters |

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(a) $10 per hydrant if furnished and maintained by owner, $25 if by company. Sprinklers, $10 for first hundred, 5 cts. each for all additional. (b) Service charge, from $17.77 for 2" inside corporation limits, to $266.66 for 12" outside; plus usage charge of from 1.667 cts to 3.111 cts per sprinkler head, and from $11.11 to $26.66 per hydrant, depending on size of service. (c) Old rate, minimum, 2,250 gal., $1.50 to 10c per M, for consumption more than 90,000 gal. (d) For factories, 5c flat less 10%; commercial, 7¼c less 10%.

being the unit used by about forty per cent and the latter by about sixty per cent of those stating the unit. Quite a number did not think to tell which unit they employed As one hundred cubic feet equal 748 gallons, the price for the former unit can be compared with that for the latter by multiplying it by one and one third.

The proper understanding of some of the figures requires a reference to the tables in the June 7th issue; especially that telling the frequency of reading meters, to be used in connection with the quantities of consumption that limit the application of maximum and minimum rates.

Considerable interesting information is given concerning changes in rates made since before the war. While the majority have made no changes, quite a number have done so. Most of these changes of course have been increases, but a few have lowered their rates. The increases have been made in different ways. Some have made a straight raise. Others have decreased or abolished the cash discount; others have raised the minimum rate, etc.

The payment by the city for fire protection, generally in the form of hydrant rental, varies from nothing to almost anything. For hydrants alone the payments run as high as $150 a year. Some cities pay the interest on the bonds as an offset to the fire protection; others pay a lump sum per year; still others make a payment including sewer flushing, use of water in public buildings, and other public uses as well as fire protection.

Even greater variety is found in the practice as to charges for private fire service. Some charge for metered consumption only; some by the size of service; others by the front foot of property; others a rate per hydrant and per sprinkler head; others base charge on value of insurance carried; others on size of building protected, etc.

The amount of free service given to private consumers will be detailed in the next issue.

*(To be continued)*

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## MILWAUKEE WATER WORKS.

The water department of Milwaukee during 1918 had an income of $1,174,812, of which $1,101,277 was for water only, which was $69,346 more than in 1917. This is a revenue of 4.819 cents per 1,000 gallons pumped. The cost of this water was 4.723 cents, this including all ordinary expenditures, sinking fund charges, depreciation, taxes and 4 per cent interest on invested capital. The cost of pumpage and ordinary expenditures only was 1.958 cents.

The net income of the department, over and above operation, maintenance, depreciation and interest on bonds, was $580,186, of which $200,000 was transferred to the city treasury to reduce the general taxes and the remainder was used for new construction and equipment. Since 1892 the department has transferred to the general city funds $2,917,965, which exceeds by $1,040,426 the sums raised for the water works by tax levies before the water department was self-sustaining.

The book value of the water works, less depreciation written off, is $9,233,316. The bonded indebtedness less sinking fund on hand is $210,000.

### NEW INTAKE TUNNEL.

To secure the water supply from Lake Michigan, three intakes have been built. The first, a 36-inch pipe extending 2,100 feet into the lake, has been abandoned. The second consisted of a brick tunnel 7½ feet diameter and 3,146 feet long to a crib, from which two parallel lines of 60-inch cast-iron pipe extend 5,000 feet further into 60 feet of water. This intake ends 3½ miles from the mouth of the harbor. It was used until December 28th, 1918, when the third or Linwood avenue intake was put into service. This intake is a concrete-lined tunnel, 12-feet in diameter and 6,554 feet long, ending in 65 feet of water. Work on this intake began in June, 1913. It terminates in a submerged crib. It was impossible to place the screen over this crib and remove from it the surplus stone and timber segments until this spring.

Before the new tunnel was placed in service it was thoroughly disinfected with a solution of hypochlorite of lime, of which 1,200 pounds was placed in the shaft in the lake and 500 pounds in the shore shaft before the tunnel was allowed to fill up. After the tunnel had been filled, water was pumped through it and wasted into the lake from November 16th to December 23d. This intake is five miles from the mouth of the harbor. It has a capacity of about 220,000,000 gallons in twenty-four hours at a velocity of 3 feet per second.

### CONSUMPTION.

The average daily consumption during 1918 was 62½ million gallons. The maximum pumpage for any one day was 84,748,400 gallons, on July 22, and the peak rate of that day was 125 million gallons per day, or just about double the yearly average. The minimum pumpage in one day was 42,681,390 gallons, or about two-thirds the yearly average.

The average daily consumption per capita was 129 gallons (plunger displacement calculation), which seems quite high considering that more than 99 per cent of the services are metered. But H. P. Bohmann, superintendent of water works, attributes the high rate to the considerable number of large industrial consumers and not to preventable leakage, waste or unknown losses.

The total per capita consumption is divided as follows:

| | Gallons Per Capita. |
|---|---|
| Dwellings and stores | 38.55 |
| Power and manufacturing | 47.33 |
| Municipal use | 13.11 |
| Under-registration of meters | 2.83 |
| Departmental free use | 1.09 |
| Unaccounted for | 19.71 |
| Allowance for pump slip | 6.45 |
| Total | 129.07 |

Of the 86,413 taps and service pipes laid, 20,692 extend to the curb only, or are turned off at either curb or main, and are not in use. Of 1,108 taps and branches put in last year, 799 were "improvement taps" and extended to the curb only.

### BENDS IN WATER MAINS.

A break at one point and a threatened break at another in Milwaukee last year emphasize the desirability of tying together the pipes and specials at bends, especially in large pipe and at offsets.

A 30-inch feeder line crosses under the Menomonee river, dropping down to the crossing with two 45° bends. The main here was under about 90 pounds pressure and the joints in the offset pulled apart. A similar accident was averted by the discovery of a leak in an elbow of the 36-inch main in the shaft of the Knapp street tunnel. In each case the joints were cut out, the pipes and specials were provided with lugs fastened on with heavy bands, and the several pieces tied together by 1½-inch rods.

To prevent similar accidents, whenever there is a bend or dead-end in large pipe or under any considerable pressure, each bend or other piece at the end the straight run of pipe should have lugs cast on it, as should also the last two pieces of straight pipe nearest to it, and the joints be tied together by rods or long bolts.

# The WEEK'S NEWS

**Improving Water Supplies in Ohio Cities Reduces Typhoid—Decision in Important Water Pollution Case—Rating Cities in Venereal Disease Campaign—Seven-Cent Fare Refused by Maine Commission—Company Wins in Toledo Fare Fight—Carmen's Union Sued for Pittsburgh Strike Damages—Oregon Contracts for 389 Miles of Highway—Akron Firemen and Police Get Salary Raises.**

## WATER SUPPLY

### Typhoid Reduced by Improved Water Supply.

Columbus, O.—Water supply improvements have prevented seventy cases of typhoid fever in five cities in Ohio since the beginning of the year, according to the state department of health, basing its estimate upon a comparison of the 1919 total of cases reported to May 25, with the corresponding figures for last year. Striking evidence of the value of pure water supplies was furnished by the records of East Liverpool, Zanesville, Springfield, Ashtabula, and Conneaut. East Liverpool has reported no typhoid cases this year. Up to the corresponding time last year its reports totaled 12 cases. The city's new water purification plant began operation in July, 1918. For Zanesville the 1919 total to date is 11 cases, of which nine occurred before water from the city's new filtration plant came into general use about February 1. The other two are believed to be due to contact infection. Up to May 25 last year, Zanesville reported 30 typhoid cases. Springfield reported 27 cases in January, 1918, and in the next four months. No cases have been reported this year. Treatment of the city water supply with liquid chlorine was begun in February, 1919. Ashtabula and Conneaut placed their purification plants under expert technical supervision last November. To date this year, Conneaut has reported one typhoid case and Ashtabula none. In the first five months of last year Conneaut reported eight cases and Ashtabula three. Health department officials are awaiting with interest reports of typhoid prevalence in Ironton during the latter part of this year, after the new purification plant now nearing completion is put into operation. Thus far this year Ironton has reported 32 typhoid cases. Through May last year the total was 24. A sharp drop is expected as soon as the purified water is pumped into the mains.

### Court Defines Water Pollution.

Rahway, N. J.—The opinion of vice-chancellor John H. Backes, directing an injunction against the Chemical Company of America to cease causing pollution of the Rahway River, leaves little leeway for that company to continue operations in its Springfield plant unless an entirely new method of disposing of waste matter is evolved by October 1, the time when the injunction against storing waste matter on the banks of the river becomes effective. The conclusion of the vice-chancellor makes it clear that the embankment of the present lagoons are inadequate, and also upsets the plea of the company that the filtration plant at Rahway was partly responsible for the condition of the water. At a hearing last May before the vice-chancellor, his conclusion says, pollution was established, but as it was not appreciable at Rahway and the company was furnishing to the Federal Government an exclusive product for the prosecution of the war, the inconveniences of the parties in these circumstances were considered and the injunction was withheld. After the signing of the armistice the state brought the case up again, declaring that the pollution continued, notwithstanding the efforts of the defendant to abate it. Despite the company's earnest endeavor to prevent it, the lagoons are not watertight and some of the waste still leaks into the streams, polluting them. A part of the easterly wall of the first lagoon is made up of a penetrable railroad embankment, through which the liquid has been found to seep into a narrow and shallow run called Flemmer's ditch, which empties into the north branch or stream. "Personal observation," says the vice-chancellor, "bottle samples and analyses of the brook water satisfy me of this. It is also evident that the lagoons are fissured and that the diversion of the channel of the south branch furnished but a temporary remedy." Fish life in the stream in the vicinity of the factory was all destroyed during the first years of its operation as the result of the unrestrained flow of the waste into the stream, and at that time it could be smelled and tasted in the drinking water of Rahway. It is not a good plea of the defendant, says the conclusion of the vice-chancellor, that the former conditions have been mitigated and that Rahway would suffer no inconvenience if its filtration plant were up-to-date. "The aim and policy of the Legislature," says the decision, "as evidenced by the statute, is to secure to populated communities wholesome drinking water and in vindicating the sovereign right of the state to the purity of its streams, it last year adopted measures more emphatic than before by placing its ban upon specific contamination and things in general that are polluting. The original act of 1889 prohibited the discharge into or depositing upon the banks of streams of matter of a polluted character and the 1918 amendment determined such refuse and castoffs contaminating and forbade their discharge into streams or deposit upon the banks. The defendant is violating the law in respect to both of these statutes," says the vice-chancellor. The vice-chancellor goes somewhat into the definition of the word "banks" as related to a stream of water, giving the various definitions of authorities and showing that they are meant to include the region of land directly leading to the brink overlooking the stream. "The legislative scheme to purify the streams of the state contemplates the exclusion of two avenues of corruption," he states, "that of direct discharge of polluting matter into the water, which necessarily includes depositing on the bank from which it is bound to fall or flow into the stream, and that of depositing it so near the bank as to constitute a threat or menace of ultimately reaching the water contaminating it. Now to give the word 'banks' as used in the statute, a construction other than its popular signification—the immediate drainage region of lands contiguous to streams—would render the design of the second feature of the act wholly abortive. It would be playing with words and trifling with legislative mandate to hold that discharge of polluting matter on the bank anywhere below the brink would be violative of the statute, while a deposit on the land an inch away from the brink would not be."

## SEWERAGE AND SANITATION

### Rating the Cities for Venereal Disease Work.

Washington, D. C.—The 710 cities in the United States with a population of 10,000 and over are to be graded by the Public Health Service with reference to their fighting strength in the national war against venereal diseases. It is possible for cities to make as high as 1,000 points by adopting the necessary repressive measures. The work has progressed almost to the point where actual grading will begin. The various organizations in each place have been communicated with and asked to nominate the organization best suited to carry out the Public Health Service program. In most cities the board of health was named, but in a great many the Rotary Club was mentioned as the best organization for co-operation with the boards of health and city officials. The grading will be divided into the following points: For a city ordinance embodying the essential points for the enforcement of the state venereal disease control bill, as approved by the Public Health Service, 50 points. Free clinics for the treatment of venereal diseases, 125 points. The clinics must be in operation and well advertised. Hospital facilities for the treatment of venereal disease patients, 75 points. There should be ten beds for each 10,000 of population. Effective measures for the elimination of advertising quacks and a campaign to prevent the sale of venereal disease nostrums, 50 points. For the posting of placards to educate the public against the danger of venereal diseases, 50 points. For the distribution of educational pamphlets as published by the Public Health Service and State Boards of Health, 65 points. For delivering a certain number of lectures to the representative organizations of the city, 50 points. For the exhibition of motion pictures approved by the Public Health Service or board of health, 65 points. For an exhibit on social hygiene, 50 points. For a law prohibiting prostitution, 25 points. For a law regulating rooming houses and hotels, 30 points; for a law regulating dance halls, 25 points. For a law regulating taxi cabs, 20 points. Adequate detention facilities for delinquent girls and women, 50 points. For reformatory facilities for girl and boy sex offenders, 25 points. An institution for feeble-minded sex offenders, 25 points. For the efficiency with which the laws designed to repress prostitution have been enforced, 100 points. For teamwork among the different agencies interested in the enforcement of the law, 100 points. For the availability in public libraries of approved reading matter on social hygiene, 20 points.

### Sanitary, Flood Prevention and Power Development.

Watertown, N. Y.—Improvements in the Black River watershed of far-reaching importance, not only from a water power standpoint, but also from the standpoint of sanitation and general public welfare, is assured by the announcement made by the commission composed of conservation commissioner Pratt, attorney-general Newton, and state engineer Williams, that it has formally ordered the creation of the Black River Regulating District. This means that now a series of storage reservoirs may be constructed in the headwaters of the Black River and its tributaries, which will maintain the flow of the water in that stream during the dry months at such a level as to guarantee power to the mills. It means that there will be less refuse lying on the river banks caused by the receding flood waters to cause a nuisance during the hot months when the water is low; and it will mean better and purer water, and a general building up of the entire district. The announcement comes as the result of a petition recently submitted to the commission by the city of Watertown and others, upon which a hearing was held in the office of the Conservation Commission in Albany. The next step will be appointment by Governor Smith, of the Black River Regulating Board, which will prepare the necessary plans by the Conservation Commission, and the organization of the machinery necessary to finance the project, and work of building the reservoirs will be put into effect. During the past three years the Conservation Commission has spent much time in making surveys of the Black River and investigating its power possibilities. It has maintained a number of stream gauging stations and has prepared maps and plans, and issued reports which will form the basis of any improvements which may be made by the Black River Regulating Board. According to the Conservation Commission, the most feasible of the many undeveloped storage sites on this watershed are the enlarged Forestport reservoir on the Black River; Higley Mountain and Panther Mountain Reservoirs, on the Moose River, and Beaver Lake, Stillwater reservoir, and Lila Lake, on the Beaver River. By the construction of these reservoirs the commission estimates that about 4,000,000,000 cubic feet of additional storage can be obtained on the Black River, about 10,000,000,000 cubic feet on the Moose River, and about 6,000,000,000 cubic feet on the Beaver River. Already there is a large industrial development on the Black River, composed mostly of paper and pulp factories, with water power installation aggregating about 90,000 installed horse power. Under present conditions, however, only about 30,000 horse power is available in dry weather. With the assistance of the above-named reservoirs, not only could the present factories run at full capacity the year round, but an estimated horse power of over 250,000 could be produced. If some of the smaller reservoir sites at a later date prove to be feasible this amount could be materially increased. From the standpoint of the general public, advantages resulting from the improvement would be the cessation of floods which annually damage private property, and abatement of the nuisance which results from debris and foul matter deposited by the receding waters. Watertown obtains its drinking water from the Black River, and in the summer months when the water is very low and the pollution of the water is correspondingly high, the work of proper filtration is extremely difficult.

## TRAFFIC AND TRANSPORTATION

### Commission Refuses Permanent 7-Cent Fare.

Augusta, Me.—The state public utility commission has refused the application of the Lewiston, Augusta & Waterville Street Railway, Augusta, to make permanent the 7-cent fare adopted by the company in June, 1918, with the approval of the commission. The commission has, however, ordered that the schedule which has been in effect "be continued for one year from June 1, 1919, unless sooner canceled by the commission." The commission is "convinced from our examination of the accounts of the company, and from our general knowledge of conditions on this particular railway and on the electric railways generally throughout the State and throughout the country, that no reduction in fares is at present warranted." The commission made the following review as to the results so far obtained:

> The company at the hearing on May 21, this year, presented a statement of its operating revenues and expenses for the years 1913, 1914, 1915, 1916, 1917 and 1918, and a detailed statement of its revenues and expenses by months from June, 1916, to May 1, 1919. This statement shows that while the revenues since June, 1918, have been materially greater (with the exception of one or two months) than they were in either of the other years, it also shows that the cost of operation has in most of the months outrun the increase in revenue. It has resulted in the necessity of the passing by the company of its dividends on preferred stock, and since October, 1918, has resulted in a deficit each month—such deficit ranging from $1,751 in April of this year, up to nearly $20,000 in October, 1918, and it shows that for the calendar year of 1918, the deficit was $135,915, and that the deficit for the eleven months ending May 1, 1919, was $57,680.
>
> This latter deficit is, however, substantially less than for the same period a year previously, when the deficit was $81,759. While the statement is not entirely encouraging, it is not anywhere near as discouraging as were the conditions the company faced a year ago. But in spite of the better showing during the past year, a substantial deficit still exists, and the company faces the proposition that wages will probably remain, for a time at least, at the present level, and other costs of operation will not be materially lessened for a considerable period of time.

### City Restrained from Interfering with Cars.

Toledo, O.—The Federal Court of Appeals at Cincinnati, has given out its opinion in the appeal of the city against the Toledo Railways & Light Company affirming the injunction decree of District Federal Judge Killits, of Toledo, restraining the city of Toledo from interfering with the company's operation of its lines in Toledo and the collection of fare at the rate of 5 cents for adults and 1 cent additional for a transfer. In its decision, the court says the injunction decree appealed does not operate to interfere with the right of the city to pass proper legislation to regulate the fares, nor does it prohibit the city from passing ordinances directing the railway to vacate the streets, remove its rails and prescribe regulations for such removal. Neither does the court prevent the city from fixing fares and providing for exclusion of the company from the use of Toledo streets in the event the rates are so fixed and not accepted. In the opinion, Judge Dennison says:

> Upon this record, and in this court, the city does not undertake to dispute the claim of the company that any rates or fare less than the proposed new schedule would have been confiscatory, and, if enforced against the company, would have been a taking of its property without justification, and would violate its constitutional rights.
>
> By the line of decisions of the Supreme Court, culminating in the Denver Water Company and the Detroit United Railway cases, it now is clearly settled that when the franchise rights of a public service corporation to use the streets of a city expire, the city has the absolute right to order the discontinuance of the service and the removal of property from the streets; that the company has a corresponding right to make such discontinuance and removal, but that if neither party exercises this right, and if the company, at the city's request, continues to occupy the streets and to give service, the public regulating power can be exercised only subject to the condition that it must not bring about confiscation.

In the Detroit decision, the Supreme Court said that the city could have ordered the tracks from the street after the franchise expired, but that the city can not compel the company to continue its transportation business at a loss.

### Sues Union for Damages to Public in Car Strike.

Pittsburgh, Pa.—A novel action has been brought by a Pittsburgh attorney, who is suing the Amalgamated Association of Street & Electric Railway Employes for $2,038,000.78, which sum he estimates as the amount of the damages that were inflicted by the employes of the Pittsburgh Railways in their recent strike, which lasted four days. A. E. Anderson, in his petition for a hearing in equity in the matter, submits a tabulated bill of damages resulting from the strike. His own share of this bill is the 78 cents, the difference between his railroad fare during the strike, and car fare. The other $2,038,000 is what he figures as the loss sustained by the riding public in paying for transportation during the strike at rates higher than carfare, by the receivership of the company in loss of revenue, and by the strikers themselves in loss of wages. Attorney Anderson has entered his suit in behalf of all of them. The suit is regarded merely as a test case. The complainant raises the point that public service employes may not lawfully strike, and he wants a court to hear his arguments and rule on the question. Mr. Anderson contends that courts have held that the right of persons to quit work and induce others to do so is "necessarily subject to limitation when employment is accepted in a business charged with public interest." His huge bill of damages is made part of his suit to show the extent to which the public interest was involved in the strike. After setting forth the circumstances of the strike, Attorney Anderson concludes with a petition to the court that it decree that the actions, rules and regulations of the defendant association, its officers and members are illegal, null and void, and that the association, its officers and members have become liable to "your orator and other citizens for the loss and damages above set forth."

## MISCELLANEOUS

### Contracts for 398 Miles in Oregon.

Salem, Ore.—The state highway commission records show that the state up to date has contracted and under construction roads aggregating a cost of $6,987,605.23. The total mileage is 398.7. These roads are to be paid for from the $6,000,000 in bonds under the enactment of the legislature of 1917, the quarter-mill tax fund, automobile license receipts, receipts from the tax on gasoline and distillate imposed by the legislature of 1919, and for post and forest roads, which are included in the aggregate from the Bean-Barrett co-operative bonds under which the state receives federal aid to the extent of half the cost of construction. The $10,000,000 bond issue of the 1919 legislature has not yet been touched by the highway commission and will not be until the last quarter of this year. Pending approval, this issue is now in the hands of bonding attorneys for investigation. The $6,987,605.23 represented by projects now under construction embraces $1,471,690.71 on the Columbia River highway, $2,900,052.91 on the Pacific highway, $1,097,481.70 on the West Side highway and $1,518,379.91 on miscellaneous projects. Federal aid in the improvement of post and forest roads of the state now contracted or proposed, covering half the cost, will aggregate $3,642,460.08, which means $1,231,962 for post roads in western Oregon, $953,592.08 for forest roads in western Oregon, $1,268,182 for post roads in eastern Oregon, and $170,724 for forest roads in eastern Oregon. Post and forest roads actually under contract in western Oregon will cost, according to the commission's records, $1,121,828, and in eastern Oregon, $428,033. The government's share of the cost will be half, or $560,914 in western Oregon, and $214,016.50 in eastern Oregon. To procure federal aid for any post road, the state is required to show that the road actually is a carrier of mails, or that there is a reasonable prospect that it will be a carrier of mails as soon as completed. The requirement relative to forest roads before federal aid is available is that they must lie wholly or in part within national forests. Government funds are forthcoming under the federal aid road act. Conceded to be the most important of federal aid projects in the state under construction at the present time, is that stretch of the John Day highway, between Dayville, Grant county, and Fossil, Wheeler county. This improvement will open up an immense new territory to traffic, and besides will make an automobile trip from Ontario to Portland 120 miles shorter than the trip by railroad. New coast country will be opened to traffic, and distances will be appreciably shortened by lateral roads projected to connect the Pacific highway with the coast. Surveys are now being made for a post road from Roseburg to Myrtle Point, and a forest road from Eugene to Florence. A forest project extending from Corvallis to Waldport, by way of the Alsea river, is contemplated and the survey for a new highway from Corvallis to Newport will be made this summer. The road from McMinnville to Tillamook, now under construction, will be completed this year. Next winter it will be possible to travel by automobile from McMinnville to Tillamook, and it may be possible to motor the entire distance from the northern to the southern boundaries of the state on the Pacific highway.

### Akron Claims to Have Highest Paid Firemen.

Akron, O.—The new budget for the last half of 1919 contains salary increases for the fire and police departments. These raises were granted without request by the men, the fire chief being responsible for the efforts to have the raise put into effect. The firemen now claim to be "the highest paid in the world, and expect to get more in not many moons," according to the statement of one of them. A. L. Headbough, of Truck No. 1, says: "This is one department where the men are a unit; there is no discontent, and no radical elements exist. We do not have any outside advice to better our conditions. This department goes on every other day off Jan. 1, 1920. This is another time our city officials were broad-minded, and gave the increase without our having to go before them." The new salaries in the fire department are as follows: Chief, $3,600; assistant, $2,580; superintendent machinery, $2,460; superintendent police and fire alarm system, $2,460; fire warden, $2,268; mechanic, $2,100; department secretary, $2,040; four linemen, $1,932; ten captains, $2,160; ten lieutenants, $1,980; two engineers, $1,926; four assistant engineers, $1,860; 83 firemen, as follows: fourth year, $1,800; third year, $1,680; second year, $1,560, and first year, $1,500. In the police department, the salaries will be: Chief, $3,000; secretary, $2,520; captain, $2,400; two lieutenants, $2,160; eight sergeants, $1,980; four detectives, $2,160 each; three signal operators, $1,860; two plain clothesmen, $1,860; 102 patrolmen as follows: fourth year, $1,800; third year, $1,680; second year, $1,560; first year, $1,500; two stenographers, $1,140 each; the matron, $960, and the surgeon, $600.

# NEWS OF THE SOCIETIES

**Aug. 26-28.—LEAGUE OF CITIES OF THE THIRD CLASS IN PENNSYLVANIA.** Twentieth annual convention, Allentown, Pa. Secretary, Fred H. Gates, city clerk, Wilkes-Barre, Pa.

**Aug. 27-29.—VIRGINIA STATE FIREMEN'S ASSOCIATION.** Thirty-third annual meeting, Charlottesville, Va. Secretary, E. K. Landis.

**Oct. 27-30.—AMERICAN PUBLIC HEALTH ASSOCIATION.** Annual meeting, New Orleans, La. Secretary, A. W. Hedrich, 169 Massachusetts ave., Boston, Mass.

**Nov. 12-14.—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS.** Annual convention, New Orleans, La. Secretary, Charles C. Brown, Springfield, Ill.

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### American Engineering Standards Association.

The American Institute of Electrical Engineers, American Institute of Mining and Metallurgical Engineers, American Society of Civil Engineers, American Society of Mechanical Engineers and American Society for Testing Materials some time ago invited the government departments of War, Navy and Commerce to appoint representatives to act with them to continue the work of developing engineering standards. Standardization received great impetus during the war because of the need of avoiding confusion caused by differing standards promulgated by various organizations. The body so formed is the American Engineering Standards Committee. It has required considerable time to definitely formulate its objects, and to arrange methods for accomplishing them that would be effective without in any way interfering with the many organizations that have been doing such work.

A new constitution of the committee changes the name to American Engineering Standards Association, the change from "committee" to "association" being regarded as more fittingly indicating the wide scope of the interests involved.

The objects of the association are stated as follows:

1. To unify and simplify the methods of arriving at engineering standards, to secure co-operation among various organizations and to prevent duplication of standardization work.
2. To promulgate rules for development and adoption of standards.
3. To receive and pass upon recommendations for standards submitted as provided in the rules of procedure, but not to initiate, define or develop the details of any particular standard.
4. To act as a means of intercommunication between organizations and individuals interested in the problems of standardization.
5. To give an international status to approved American engineering standards.
6. To co-operate with similar organizations in other countries and to promote international standardization.

Several important organizations interested in standardization will be invited to appoint representatives as soon as the necessary power is obtained. Any organization may request the association to approve standards which it has formulated, or to approve committees that it has appointed, and by so doing becomes a sponsor society.

The association, in short, is to bring together those interested in a common object, and when they have completed their work, will at their request, certify that it has been done in such a manner as to justify its adoption. The executive committee of the American Society for Testing Materials now passes on the composition of the committees, ascertains that their conclusions are substantially unanimous, and if so, reports them to the society for acceptance or rejection. The association does the same for groups of organizations.

The association has headquarters in the Engineering Societies Building, 29 West Thirty-ninth Street, New York. Prof. Comfort A. Adams is chairman and Clifford B. LePage is acting secretary. George C. Stone, New Jersey Zinc Co., is vice-chairman, and John A. Capp, General Electric Co., Schenectady, N. Y., Henry Hess, Philadelphia, and Harry N. Latey, railway department, General Electric Co., New York, are members of the executive committee.

### Southwestern Water Works Association.

At the convention of the Southwestern Water Works Association held in Kansas City, Mo., June 23-26, the members decided to reject the invitation of the American Water Works Association to affiliate with the latter. It was also determined to publish a monthly journal. The territory of the association was enlarged to take in Nebraska, and the name changed to the South-West Water Works Association, the hyphen indicating that the organization proposes to serve the South and the West—Mississippi, Colorado and one or two other states perhaps being included.

Two issues of the journal have been circulated already among the members and prospects in the territory, sufficient advertising having been obtained to more than defray the cost.

W. L. Benham presented an illustrated paper on the "Operation of the Camp Funston Utilities," together with a description of a manual of operation finally adopted as standard for all of the camps under the Maintenance and Repair Division. In the discussion of meters as detectors of waste, J. Smith, of Emporia, Kan., described a home-made clock device applicable to household meters which would make a continuous record of the consumption.

In a round-table discussion of the question, "At What Charge Per Month Can a ⅝-in. Meter Be Installed and Maintained When Owned by the City?" J. F. Anderson, who has kept meter records in Kansas City for 26 years, stated that the cost of setting varied from 50c to $7.50, and the annual maintenance from 3c to $2.50 annually.

Leon J. Kahn, Shreveport, La., was elected as president and E. L. Fulkerson, Waco, Tex., as secretary. The 1920 convention will be held in New Orleans and in October instead of June or July.

### Joint Committee on Concrete Pipe.

The joint committee of various societies to prepare specifications on concrete pipes and culverts has been organized. The societies joining in are the American Railway Engineering Association, the American Association of State Highway Officials, the American Concrete Institute, the American Society for Testing Materials, and the Concrete Pipe Association. The first sub-committee which is actively to begin work is one which is to prepare specifications on culvert pipe.

# INDUSTRIAL NEWS

### Concrete Swimming and Wading Pools.

A new bulletin has been published by the **Portland Cement Association** on the subject of swimming and wading pools of concrete construction. The whole subject is interestingly covered in a practical way, from the selection of a good site to the proper way of constructing a springboard. Actual plans and specifications are given for various types of construction and each point is illustrated with photographs of successful practice.

**The Dayton-Dowd Co.**, Quincy, Ill., has issued a new bulletin, No. 240, showing its re-designed line of CS single stage, double-suction type centrifugal pumps. The publication is completely illustrated with photographs and sectional diagrams of the different types of pumps and of interesting installations. The features of construction and operation of the pumps are convincingly described. Important points of design and performance are brought out by characteristic curves of tests. Useful electrical and hydraulic data are given in the bulletin.

### "Protecting the Water Supply of Greater New York."

This is the title of a new edition of technical publication No. 5 issued by **Wallace & Tiernan Co., Inc.** This describes and illustrates some of the points of interest in the great water supply system of New York City, especially chlorination. The chlorinating units at different stations are shown and their work described. The publication is excellently gotten up and properly illustrated with photographs, maps and charts. It should prove of decided interest to anyone concerned with water supply.

The company has also issued a striking folder entitled "How Much Is Three Billion Gallons?" This is the amount being rendered safe daily by chlorination with "W. & T." control apparatus.

# Municipal Journal & Public Works.

City County State

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*City officials and civic organizations are particularly requested to send to Municipal Journal and Public Works regularly their annual and special reports.*

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## FREE WATER.

Almost all water works plants, both municipal and private, give an indefinite amount of free water for public purposes, such as fire extinguishing, flushing streets and sewers, public fountains, etc. Not so many, however, give water for private purposes without charge, and yet quite a number do. The most extreme case is Hudson, N. Y., which makes no charge for any water used for domestic purposes. A few donate the water used for building purposes, sprinkling sidewalk parking, and by those who are too poor to pay.

By far the greatest number, however, give the water used by charitable and religious organizations—churches, hospitals, Y. M. C. A., etc. It may be questioned in this, as in the case of taxes, whether it would not be fairer to the consumers and tax payers, as it certainly would be more business like, to charge all of these for water used, letting council appropriate the funds for paying the bills, if it wishes to. To the giving of the water without charge there are at least two objections—that the water will be used more freely (wasted), and that the consumers who pay are required to pay for this free water whether or not they wish to or are in sympathy with the organizations favored.

## THE DOTEN SEWAGE TANKS.

While the daily papers have had little to say concerning the sewage treatment plants at the cantonments (except that in some cases the effluents from them have caused a nuisance in the streams receiving them), among sanitary engineers it has been known that many of them were giving trouble—in fact, some began to deliver effluents more offensive than the crude sewage.

The chief difficulty was that the tanks accumulated solid matter in almost unbelievable quantities. The writer can testify from personal observation that in at least one case the first compartments of the tanks contained about eight thousand cubic feet of solid matter, and the remaining three compartments about as much more, or sixteen thousand cubic feet in all; there being only perhaps two vertical feet of clear flowing-through space in the first compartments. This of course prevented the sedimentation of any but the heaviest, grossest matters.

We do not believe that the blame for this should be placed on the type of tanks, for they have, we understand, given good service elsewhere. But they were unquestionably greatly overloaded as to quantity of suspended matter, and the quality of it seemed to absolutely inhibit digestion. Those in charge of some of the plants testify that, after standing for months, the sludge did not give off any gas whatever, while scum formed to the depth of several feet. The quality that caused this was believed to be the grease, of which the sewage contained several times the amount ordinarily found in domestic sewage.

The unprovided-for amount of solids was undoubtedly due to two causes—the presence of more men at the cantonments than had been expected, and especially the much greater amount of food consumed per capita than is used by the average city dweller. In a city, the population includes all ages, and infants and the aged are light feeders. But the men in the camps were probably as heavy feeders, every man of them, as could be found in the entire country. From this it would naturally follow that the organic matter in the sewage would be at least double the amount per capita found in ordinary city sewage.

The most obvious lesson to be learned from this experience is that, for special cases like prisons and other institutions where the inhabitants do not include all ages and occupations, special consideration must be given to the effect of this on the strength of the sewage. Also, that in these and other cases where the percentage of grease is unusually great, either the grease must be removed before it reaches the tanks, or operation without any digestion of the sludge must be provided for.

# THE CANTONMENT SEWAGE TANKS

## Difficulties Experienced in Operating Them, Reasons Therefor in the Opinion of Several Experts, and Means Devised for Eliminating Them—Sewage of Unusual Concentration and High Grease Content.

Difficulties experienced with the operation of the sedimentation tanks used for treating the sewage of Camp Meade were described in the issue of Municipal Journal for August 24, 1918. As stated there, one end compartment of each of the two tanks had become almost completely filled with sludge and scum and there was apparently no digestion of the sewage taking place. A considerable part of this trouble was attributed to the presence of large amounts of grease in the sewage, which grease was also giving other troubles, including the formation of deposits in the sewers.

Practically all of the cantonments experienced this same trouble to a greater or less degree, and it is most important that the causes be learned so that they can be avoided in future plants of this kind.

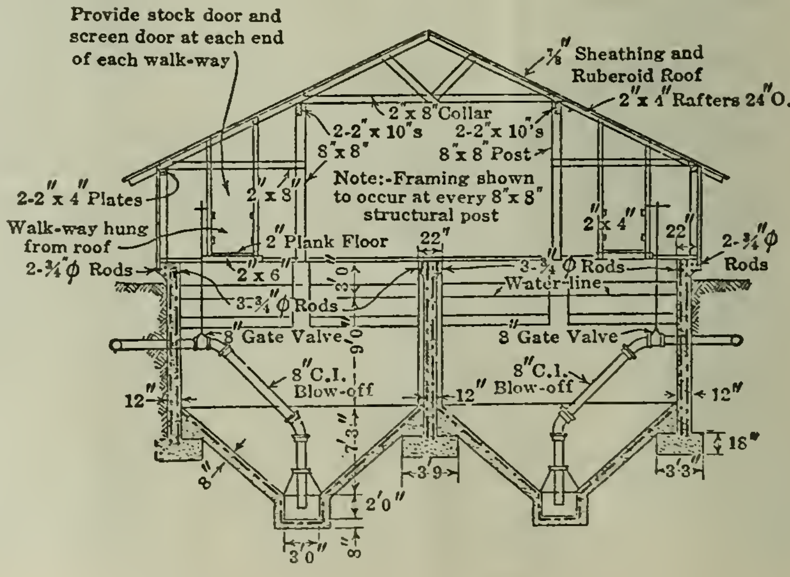
In the following article we have endeavored to embody the information furnished by a number of engineers who have been closely connected with the construction and operation of these tanks, in order that it may be readily available to the readers of this journal. Had the war continued for another year, investigation of this matter would undoubtedly have been extended to a much more definite conclusion. As it is, changes which is was thought would eliminate the trouble had not much more than been completed when the armistice was signed and the conditions at the treatment plants were rapidly changed by the reduction by fully 50 per cent in the number of men at the various cantonments. It is probable, therefore, that it will not be learned to what extent these changes would have proved satisfactory under the previously existing conditions.

The statements made are drawn from papers and discussions made public during the past few weeks or months by Leonard S. Doten, Major, Q. M. C., officer in charge of the Sanitation Section, Engineer Branch, Construction Division, U. S. A., who was largely responsible for the design of these tanks, which are commonly known as Doten tanks; Richard Messer, Major, Q. M. C., in charge of water and sewer section; Maintenance and Repair Branch, Construction Division; George A. Johnson, consulting sanitary engineer and Lieutenant-Colonel, Q. M. C., assistant to officer in charge of Maintenance and Repair Branch Construction Division; Leonard Metcalf, consulting sanitary engineer, of the firm of Metcalf & Eddy; Almon F. Fales, of the firm of Metcalf & Eddy, to whom is due most of the credit of preparing the "Manual of Operation of Water and Sewerage Works" issued by the Maintenance and Repair Branch for the guidance of the officers in the field. The information was contained in papers and discussions before the American Society of Civil Engineers and the Boston Society of Civil Engineers.

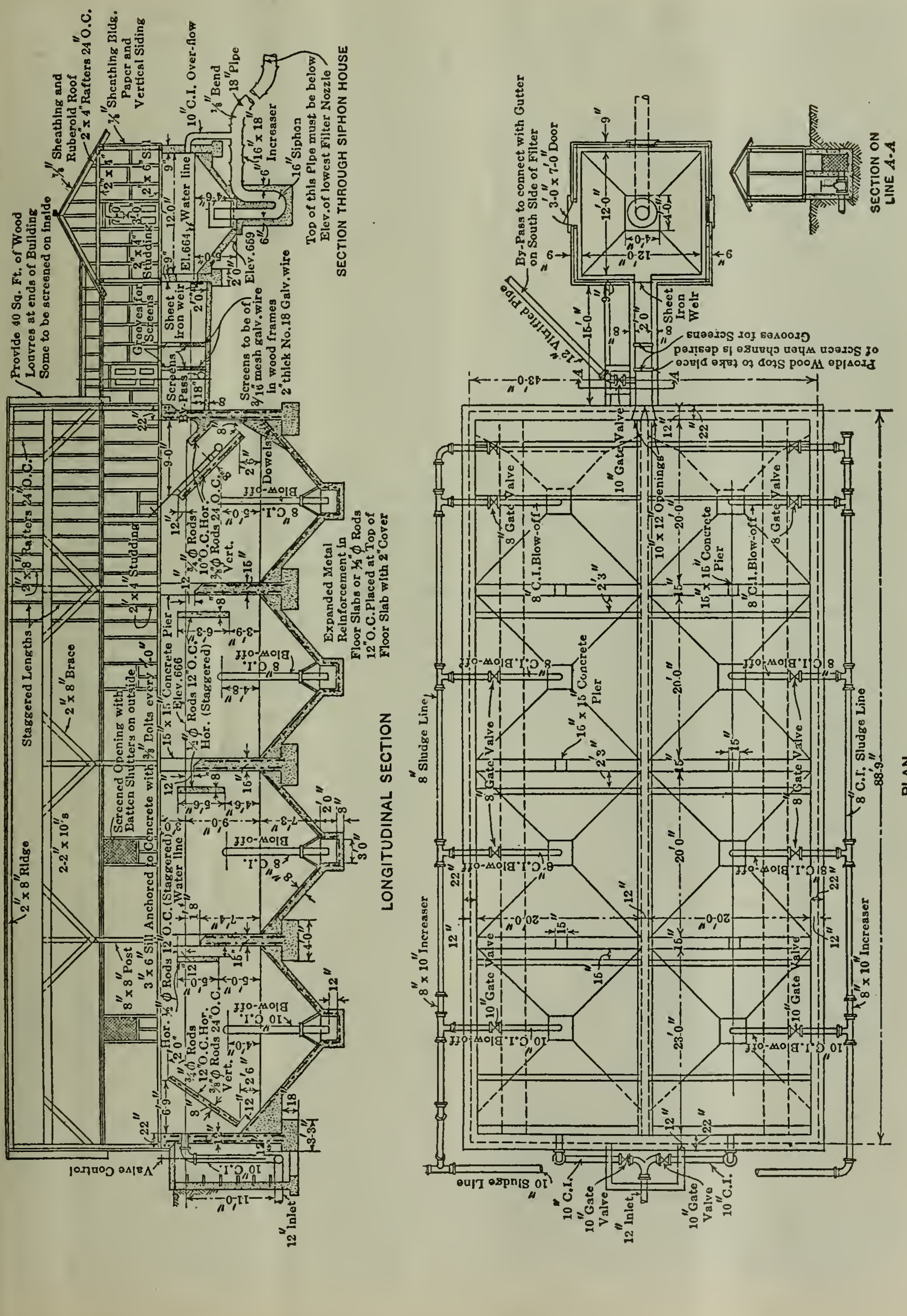
### DESCRIPTION OF THE TANK.

Owing to the brief time allowed for the complete construction of the various cantonments, including water supply and sewerage, it did not seem practicable to study each cantonment by itself and design individual sewage treatment plants, but one general type was adopted for use at practically all the cantonments. This consisted of a system of tanks for intercepting the suspended matter, followed in many cases with chlorine treatment, and in a few cases with sprinking or sand filters for further purification. Decision as to whether the additional treatment was needed was generally made in accordance with recommendations of engineers in the field who were familiar with local conditions. Sprinkling filters were installed at Camps Dix, Gordon, Meade and Pike, and of the thirty-two hospitals, five have sprinkling filters and two have sand filters.

The use of the Imhoff tank was practically decided against at the beginning, owing to the difficulty and consequent delay which might be caused by the necessity for deep excavations for these two-story tanks, and also the greater cost. Mr. Doten estimated that, for the conditions which would be met with, a single-story tank would extend 14 feet below the sewage flow line, while a two-story tank would need to be carried 31 feet below



TRANSVERSE SECTION OF TANK SHOWN ON OPPOSITE PAGE.



LONGITUDINAL SECTION

SECTION THROUGH SIPHON HOUSE

PLAN

SECTION ON LINE A-A

Provide 40 Sq. Ft. of Wood Louvres at ends of Building Same to be screened on inside
1/8" Sheathing and Ruberoid Roof
2" x 4" Rafters 24" O.C.
7/8" Sheathing Bldg. Paper and Vertical Siding
10" C.I. Over-flow
1/8 Bend
18" Pipe
16" x 18" Increaser
16" Siphon
Top of this Pipe must be below Elev. of lowest Filter Nozzle
Water line
El. 664
Elev. 669
Sheet iron weir
Grooves for Screens
Screens to be of 3/16" mesh galv. wire in wood frames 2" thick No. 18 Galv. wire
Screens By-Pass
2" x 8" Ridge
2-2" x 10"s
2" x 8" Brace
Staggered Lengths
2" x 8" Rafters 24" O.C.
2" x 4" Studding
8" x 8" Post
3" x 6" Sill Anchored to Concrete with 5/8" Bolts every 4'-0"
Screened Opening with Batten Shutters on outside
15" x 15" Concrete Pier
Elev. 666
Dowels
Blow-off
8" C.I.
10" C.I.
Expanded Metal Reinforcement in Floor Slabs or 1/2" ϕ Rods 12" O.C. Placed at Top of Floor Slab with 2" Cover
Valve Control
12" Inlet
By-Pass to connect with Gutter on South Side of Filter
3'-0" x 7'-0" Door
12" Vitrified Pipe
Sheet Iron Weir
Provide Wood Stop to take place of Screen when change is desired
Grooves for Screens
43'-0"
88'-9"
10" Gate Valve
8" Gate Valve
8" C.I. Blow-off
10" C.I. Blow-off
10" x 12" Openings
16" x 15" Concrete Pier
8" Sludge Line
8" C.I. Sludge Line
8" x 10" Increaser
10" Sludge Line
10" C.I.
12" Inlet

PLAN AND SECTION OF TWO-UNIT TANK ADOPTED AS STANDARD FOR CANTONMENTS.

such line, or about 20 feet below ground water line assumed as the normal average for the several camps. In addition, it was believed that the Imhoff tank would be less well adapted to treating fresh, uncomminuted camp sewage. Experience has indicated that the difficulty of using the Imhoff tank would have been even greater than was anticipated.

The Doten tank is a multiple-compartment, horizontal-flow tank with baffles and cross-walls or weirs arranged in such a way as to facilitate sedimentation and the withdrawal of sludge. The standard adopted for the cantonment consisted of two or more units, each consisting of a rectangular tank divided into four compartments in series, each compartment with a pyramidal bottom. Each compartment is 23 feet 6 inches square and provides for a depth of 7 feet 9 inches from the water level to the top of the hopper bottom, which bottom is 6 feet 6 inches deep at the center, the sides sloping one on two. The bottom baffles, or sludge partitions between the compartments, are of concrete and extend to within twelve inches of the water level. A top bottle, or scum partition, also of concrete, is placed two or three inches in front of each sludge partition. The vertical distances between the top of the hopper bottoms and the lower edge of the scum partitions are 18 inches, 12 inches, 6 inches and nothing in the first, second, third and fourth compartments respectively. The effluent passes out over the edge of a collecting trough which extends entirely across the outlet end of the tank.

In each hopper is provided a cast iron sludge pipe, the diameter of the pipe in the first compartment being 10 inches and in the other 8 inches. The ends of these pipes are notched to rest on 1¼-inch horizontal bars placed four inches above the hopper at the center. The sludge pipe extends vertically for a short distance above the bottom and then takes an angle of 45 degrees and, with another 45 degree bend, becomes horizontal and passes through the side wall of the tank and connects with a sludge main of eight- or ten-inch cast iron pipe. The sludge pipe in the first compartment is provided with a vertical branch forming an extension of the lower end of the pipe and extending to a point above the water surface, by which means is afforded for agitating the sludge below the opening into the pipe.

In designing the tanks, assumption was made of an average daily sewage flow of 60 gallons per capita for cantonments and camps, 150 gallons per bed per day for hospitals with 60 gallons for each attendant. An average detention period of six hours was assumed, based on the net capacity of the tank after making an allowance for sludge capacity. (According to Col. Johnson, the original tanks were as a rule designed on the basis of 10 gallons capacity per capita of authorized personnel. "For example, if the camp was built for 40,000 men, the capacity of the tanks was made 400,000 gallons.") Up to the close of 1918, 150 tanks of this design with a total capacity of 20,000,000 gallons had been built, distributed all over the United States. Only 19 filters with a total area of 447,000 square feet had been built.

### OPERATING DIFFICULTIES.

Although the full extent of the difficulties that would be experienced were not realized, most of the engineers in the Construction Division who were engaged upon this part of the design believed that this tank would involve difficulties in operation as compared with certain other forms of tanks, but, "in view of the uncertainty as to the length of the war and that the majority of installations would be temporary only, decision in favor of speed and low first cost, rather than economy of operation, was undoubtedly a wise one." (Col. Johnson.)

Soon after the cantonments had filled up, it became apparent that it was impracticable to secure digestion of the sludge in the tanks, but that they must be used as sedimentation tanks only, which required frequent removal of both scum and sludge, especially from the first compartment. Instructions were issued on August 1, 1918 providing for the removal of scum and sludge at weekly intervals when necessary; supplementary instructions issued later provided that the combined thickness of scum and sludge in the first compartment should not be permitted to exceed five feet. This removal was found to be a most difficult operation, owing chiefly to the clogging of the sludge pipes, which was due in part to the obstruction offered by the supporting rods across the mouth of the sludge pipe and upon which it rested. (In one case, at least, this difficulty was overcome by placing a tee at the foot of the sludge pipe with the two openings in a horizontal axis, so that neither was obstructed by the support, and if one should be clogged the other would still be open for service.)

The material removed from the first compartment is undigested and must therefore be deposited in trenches and covered with earth immediately. That which is removed from the remaining compartments is generally partially digested and can be spread on artificial drying beds.

According to Maj. Messer:—"Experience has shown that the secret of securing efficient clarification (and it is possible to get very good clarification from these tanks) is to keep the first compartment compartively clean. . . . As a general rule, when a tank is working at capacity, very little digestion occurs in the first compartment and the sludge drawn off must be disposed of in trenches. With this method of operation, the settleable material which passes into the second, third and fourth compartments will usually sink to the bottom in the form of sludge, and very little scum will be formed. The tests at Camp Custer, which were made under the supervision of Capt. C. B. Hoover, showed that it was possible to secure a very high degree of clarification. With clean tanks, the clarification, determined by Imhoff glasses was usually above 95 per cent and sometimes as high as 100 per cent. A removal of 90 per cent or more of the settleable solids, determined on the basis of two-hour settling periods, is a reasonable expectancy with a retention capacity in the tank of ten gallons per capita or more."

According to Maj. Doten, "The effluent from a Construction Division type of tank, when functioning normally, is superior to that of a plain sedimentation tank, due to the fact that the very finely divided matter borne in suspension is partly mineralized." This statement apparently justifies Mr. Metcalf in saying that, of those engineers who passed upon the design of these tanks originally, only Maj. Doten believed that they would act as digestion tanks.

### CAUSE OF THE DIFFICULTIES.

Mr. Metcalf attributes the difficulty in the functioning of these tanks to the fact that they were operated as digestion tanks. He says that the other engineers felt "that they should be regarded essentially as sedimentation tanks, and if so operated the tanks would do the work of clarification, and that was all that was thought necessary in the majority of cases. As soon as it was appreciated, by those who were operating the tanks, that they had to be operated on the sedimentation rather than on the complete digestion basis, they functioned properly, and early difficulties, such as clogging, were surmounted."

The difficulties referred to were practically all embraced in the single one that the matter that collected in the tanks failed to liquify or gasify and the sewage was so concentrated that the amount collected was greater than anticipated; the result being that in a comparatively short time the first of the four compartments was almost filled solid with sludge and scum.

Concerning the conditions that occasioned such result, Maj. Doten says: "The wide variations in rates of flow at camp sewage treatment plants, the extremely high suspended organic content of the sewage, and the inhibiting influence on bacterial development resulting from the excessively large quantities of grease, are important factors in determining the load which is borne by the camp sewage tanks. Statistics fail to show that there has ever been any instance where these adverse fundamental factors were so great. This is a fact that should not be overlooked in assigning tanks of this type to their proper place in the sanitary engineering practice of the future."

The sewage flow at the various cantonments ranged between about 35 and 60 gallons per capita per day, but the fluctuations were about twice as great as in ordinary municipal systems. The maximum rate occurred during shower-bath periods and continued from 40 to 60 minutes. The maximum hourly rate was given as about 190 per cent of the average, at 7.30 in the morning, jumping to this maximum directly from a minimum of 30 per cent of the average at 5.30 in the morning. By 11.30 the flow was down to about 93 per cent of the average. At 5.30 it again jumped to about 165 per cent, dropping again immediately and reaching about average flow by 8.30.

The unusual character of the cantonment sewage is shown by analyses made at different times in various cantonments. Maj. Doten says that numerous determinations of the grease content made at several camps indicate that 150 parts per million is a fair average quantity, and later, when improved grease traps were used, an average of 12 to 14 pounds of grease per capita per year was recovered from the sewage. This is greatly in excess of the quantity of grease usually found in municipal domestic sewage, which ranges between 20 and 30 parts per million. Fair average figures for some of the other constituents of the camp sewage are given as 700 parts per million of total organic solids; 464 parts of total suspended organic solids (the average for nine American cities is 125 parts); 48 parts of free ammonia, and 32 parts of total organic nitrogen. The strength of the sewage is attributed to the relatively small per capita water consumption, to certain waste products from the kitchen, such as garbage and grease, and due to the fact that the population used as a basis of calculation consisted wholly of adults.

At a few camps sand found its way into the system through manhole tops that were set too low, and in one or two instances through defective sections of sewer, which sand partially filled up the first compartments of the tanks.

When it was realized how much trouble the operation of these tanks would cause, it was decided to increase the tank capacity by providing five 4-compartment units instead of the two originally provided. In connection with this, the tanks were to be operated quite differently, in that the entire flow of sewage was to be run through one unit until there was evidence of disgorging of settleable solids in the effluent. This unit was then to be cut out of service and the next to be put in operation and so on in rotation through the five units. The scum and sludge in the first unit would be distributed through the four compartments of that unit and allowed to stand until all five units had been used and it was time to again put the first unit into service, which it was estimated would be five to seven months. During this time the sludge standing in the tanks would be digested. When it would be necessary to put any tank back into service, the solid matter in it would then be removed to sludge beds.

### GREASE AND GREASE TRAPS.

It was not only the strength of the sewage and the amount of suspended matter collected, but, as already stated, the grease content of the sewage that caused the failure of the sludge to digest, and Maj. Messer believes, from experience obtained at the army camps, that many of the troubles that have been experienced with institutional sewage plants and plants receiving mostly domestic sewage have been due, in part at least, to grease.

The sewerage systems were provided with ordinary tile grease traps 18 and 24 inches in diameter and about 30 inches deep. It was found that these were practically of no value whatever in intercepting grease from the camp kitchens, and a much larger trap was designed and adopted. Opinions differed as to the capacity which these traps should have, some holding that two-thirds of a gallon per capita of the men served by a given kitchen was sufficient, while others held that two or two and a half gallons capacity should be given.

During last winter the data received from the camps relative to the quantities of grease scum collected from traps of various sizes seemed to indicate that the two-gallon and three-gallon per capita traps are more efficient than the smaller one. At Camp Merritt a number of traps varying in capacity from 0.3 to 3 gallons per capita were studied, the traps being cleaned varying number of times, some only twice and others as much as 82 times during a six weeks period. It was found that the amount of grease scum intercepted by the traps not only increased with the size of the trap, but that the amount collected increased more rapidly than the capacity of the trap. The amount of grease scum collected per capita per year varied from 7.2 pounds to 100.1 pounds. At Camp Meade the traps were studied for the month of December, during which the number of cleanings of individual traps varied from 2 to 130, the traps varied in capacity from very small up to three and a half or four gallons per capita, and the amount of grease scum intercepted varied from a rate of 11.7 pounds per capita per year in the smallest to 65.7 pounds in the largest.

One important consideration in the size of the trap was that the grease-carrying water was discharged at very high rates during short intervals. Thus, at Fort Myer, where the average flow from the kitchen was 2.4 gallons per capita per day, for intervals varying from 10 to 15 minutes the flow reached as high as 1.5 to 2 gallons per capita per hour, or 36 to 48 gallons per day. Assuming these latter rates as a basis of design, the flow during a ten-minute period from a kitchen serving 200 men would be 50 to 67 gallons.

This spring the installation of new grease traps was begun, these traps being wooden boxes, four feet square inside, and having a pyramidal bottom with slopes of about 45 degrees. The water is discharged at a point about three feet above the bottom of the trap, and leaves the trap through a 2½-inch wrought iron pipe, the mouth of which is only three inches from the bottom of the trap. During periods of peak flow a self-cleansing velocity is created in the outlet pipe which tends to carry out any settleable material which would otherwise clog it. There is an emergency overflow about nine inches above this outlet pipe which will provide this amount of head should the outlet clog. Precautions are taken to exclude coffee grounds and other heavy materials as far as possible, which would collect in the pyramidal bottom of the trap and clog the outlet pipe.

In discussion on this subject before the Boston Society of Civil Engineers (from which discussion a considerable part of the above has been obtained), Leonard Metcalf cautioned those present that the tanks used in the cantonments should not be used in municipal practice, emphasizing the point already mentioned—that the designers recognized that their operation would involve difficulties and expenses which were only warranted by the fact that these plants were not expected to be in operation for more than four or five years at the outside and also that standardization of design and simplicity and rapidity of construction were vitally important features. Low construction costs were chosen deliberately with the knowledge that they would involve high operating costs.

## ROAD TAX ON GASOLINE.

Montreal, July 17th, 1919

Municipal Journal,
50 Union Square, New York City.

Dear Sirs:

Several months ago, while sitting at lunch in the hotel at St. Catharines, Ontario, I got talking with a stranger about good roads and the means of raising money for them. He suggested that a tax on gasoline used in motor vehicles would be the most equitable means of raising funds. A little later, in looking through my files of literature on paving and road making, I ran across an article by Mr. Clifford Richardson, written many years ago, in which he discussed the same matter.

Some months past, I wrote an article suggesting the "Wheel Tax," which many of the magazines published. There is some analogy between the wheel tax and the gasoline or fuel tax, as both try to secure the money from the actual users of the road in some proportion to the service they receive.

An annual tax on the "wheel" would not take into consideration how much the vehicle having the wheel was used during the year; while a tax on the "gas" would be in direct relationship to the actual use on the road. The more a vehicle is operated, naturally, the more gas it requires; also, the heavier the vehicle, the greater amount of gas it consumes per mile. Therefore, a tax on gas would most equitably compensate for the destructive use of the road by the owner of the vehicle.

The "gas" tax would, of course, present some difficulty. Means would have to be found for taxing vehicles not using gas; and there would surely be other flies in the ointment. One of these would be the necessity of the province or state carefully supervising the distribution of gasoline to users of road vehicles.

As the matter of raising money for road improvements seems to be the great stumbling block in the way of "good road" management and construction, it seems to me that this is a very vital issue today. I would like to see a much more exhaustive discussion on the subject of taxation for good roads than we have yet had.

Very truly yours,
C. A. MULLEN
Director of Paving Department, Milton Hersey Co., Ltd.

## MOTOR VEHICLES AT BLACKPOOL.

Blackpool, England, reports using motor vehicles with success for collecting refuse, for which their economy has been considered questionable in this country. Blackpool is a health resort with a population of about 60,000, increasing to perhaps 250,000 in the summer. A gasoline-operated street sweeper is used and six electric vehicles. One of the latter has been used for about four years for street sprinkling, and one of them, a two-ton motor, has been used for two years in removing household refuse. Three of the electric vehicles are also two-ton motors for refuse collection which have only recently been put into service. The "cleansing superintendent" of Blackpool, James Bee, stated recently that it was the general experience in England that electric vehicles are best for this class of service.

That municipality has a number of quite narrow streets and two-ton motors are considered to suit the local conditions. The municipal corporation buys the chassis and builds the body to its own design by the department forces. Each motor does the work of three horses in refuse removal and at a cost of about one shilling per ton less than the horses. The motors collect from four to five loads a day, averaging from ten to twelve tons a day. Six men work with each motor—a driver, four men emptying the cans and one man in the motor to assist them. While the motor is taking a load to the destructor (the haul is an average of one and a half miles), the men are bringing the cans out from the yards ready for emptying into the truck.

Street watering is all done by two 3½-ton electric vehicles carrying 750-gallon tanks. Each motor is found capable of doing the work of six horses, and the work is now done much better and with much less supervision than when fourteen horse-drawn carts were employed. The water tanks are removable, and during the winter months they are replaced with other motor bodies, which are used for removing household refuse. Comparison is made on the basis of $5 a day for horse hire, and the saving by using the electric motor is said to be at least $100 a week for each motor.

Electric vehicles are said by Mr. Bee to have been very successful in Blackpool, there having been not the slightest trouble with the batteries nor any breakdown of any description. One of the motors has been at work for practically three years with the same battery and is running to-day as well as when first received.

Incidentally, it is interesting to note that salt water is used for sprinking the streets of Blackpool. A water main runs the entire length of the promenade, with hydrants set every 300 feet. The corporation public baths and several other places in town also are supplied from this main. A few years ago the municipality spent $35,000 in extending this main to every district in the town so that sewers and catch basins could be thoroughly flushed and street watering done without having to cart water any great distance.

## LOWER REFUSE COLLECTION WAGONS.

Spokane, Wash., July 10, 1919.

Editor Municipal Journal,
New York City.

Dear Sir:—

Your editorial "Lower Refuse Collection Wagons" in your issue of June 28, 1919, discusses a problem which should be given more sympathetic consideration than it has in the past. My experience may be of timely interest.

Investigation of this problem in Spokane led to the adoption of long wheel-base trucks and wagons, specimens of which you pictured in your issue of Nov. 16, 1918. The motor trucks are 64 inches high and are equipped with side steps, upon which the men may step or place the receptacle which is to be emptied, thereby decreasing the labor involved in raising and emptying the cans. The wagons have an extreme height of 58 inches. The top side boards are hinged and may be lowered, reducing the height of the wagon about 6 inches.

By rigidly enforcing the ordinance limiting the capacity of waste cans to 30 gallons and by insisting that cans be kept in good repair, with handles intact, we have been enabled to materially reduce the number of accidents to our crews. Those accidents causing strains have been practically eliminated, as have also those resulting from heavy barrels slipping and falling on the laborer.

We have found that once the public realizes the reason for any regulation, their co-operation is gladly given. There are always a few kickers who, for financial or other reasons are unwilling to purchase proper receptacles. These persons are reasoned with. The simplest device by which barrels are proven to be bad containers, is to request the obdurate one to help carry the barrel out. A few seconds of panting and struggling always produces an inclination to purchase the regulation container without further discussion.

The responsibility for accidents on waste collection work, in large measure, must be placed at the door of the employer. Proper equipment should be provided and regulations covering waste receptacles should be rigidly enforced. As much accident protection as possible is the very least that should be offered men who are willing to do this unpleasant but most important work.

ARTHUR E. PETERSON,
Superintendent, Crematory Division.

# REDUCTION OF WATER CONSUMPTION IN BUFFALO.†

### From More Than Three Hundred Gallons Per Capita to Nearly Two Hundred—Pitometer Survey and House Inspection.

By GEORGE C. ANDREWS*.

In 1897 the Buffalo Common Council decided it more advantageous to its citizens to install more pumps and give practically an unlimited supply of water, than to control consumption by means of meters. It is hardly necessary to add that this decision was made contrary to sound engineering advice. "Free water" is a slogan that often appeals to the unthinking. It would be interesting to speculate on what that decision has cost the citizens of Buffalo in the past twenty-two years. Suffice it to say that in 1903 the Bureau of Water had a bonded debt of $3,699,382.00, while it was $12,141,524.00 in 1917. From that date until 1917 it was a race between the unchecked waste both in mains and in houses and the pumps.

In 1903 there was one pumping station with a daily capacity of 183,000,000 gallons. In 1917 there were two pumping stations with a combined daily capacity of 330,000,000 gallons. Coincident with the increased pumping capacity large distributing mains were laid. During this period the per capita consumptiton had ranged between 302 and 339 gallons per day. Of this practically 100 gallons was for industrial use.

In 1916 the city government was altered and a commission of five men elected to govern the city. Their platform was an economical and efficient city government, and one of the early efforts was an investigation as to means to reduce the city water consumption. As all water used must be pumped from Lake Erie against a head of 140 to 204 feet, a reduction in pumpage would make an immense saving in coal used for fuel. Various methods were considered and in the spring of 1917 it was decided to have a pitometer survey made of a small section of the city with the idea of covering the whole city later should this section show satisfactory results. The question of metering was considered, but rejected on various grounds, some of which were: Popular local prejudice against metering; length of time to completely meter city (there being over 76,000 unmetered and active services), while the pitometer method promised early results; extensive changes in plumbing required, should meters be installed, in many of the poorer types of dwellings; heavy initial investment required for meters.

To facilitate the work, and also that definite records might be obtained of water consumption in different areas, the city was divided into ten sections, no two of which were similar in character, and work completed by sections.

Section 1 included manufacturing use, poor, good, and highgrade residential districts.

Section 2 is an old residential section with most of the buildings antedating the modern sewer and water service. In this section the toilets are usually of the so-called anti-freezing type, installed in a shed in the rear of the house. The waste in this section was tremendous.

Section 3 is a section of the city sub-divided in the '90's, when water mains, sewers and services were laid. This section is only now being developed. The residences built are of fair construction. In this section the rock lies close to the surface and in many streets water mains and house services are laid in the sewer trench. The value of the pitometer was proven in this section, as ever-leaking unfinished supplies which were discharging into the sewers were discovered and stopped. Along Fillmore avenue, quarries had been opened years ago and water from a broken 16-inch main discharging into the face of the pit had for years furnished excellent water for men and teams working in the quarry.

Section 4 is principally high class residential. In the western portion, however, is heavy manufacturing use of water and poor-class dwellings. Seventy-five per cent of this section is built on rock strata close to the surface.

Section 5. High class residential principally, with eastern portion of middle-class dwellings. No manufacturing use of water.

Section 6. This section takes in the heart of the business section of the city. Northern portion is composed of middle-class dwellings, but 80 per cent of water is used commercially.

Section 7. Poorer class dwellings and large manufacturing use of water. All the big packing-houses and stockyards are included in this section.

Section 8. This section includes most of the water front of the city, with large manufacturing plants and commercial use of water. Poor class of dwellings, and the oldest section of the city.

Sections 9 and 10. Middle-class dwellings, with some large steel mills on the outskirts. Also railroad yards are large consumers in these sections.

The theory of a pitometer survey is briefly described as follows: A certain section of the mains is isolated by closing all but one of the boundary valves. A special corporation cock is inserted on the main feeding this district through the open valve. The main is traversed and the velocity of the water determined by the instrument inserted in the main through the corporation cock. Gaugings are recorded on sensitive paper for 48 hours and from the velocities shown the flow is computed. As all the water entering this section passes the instrument, the amount measured must be the consumption of the district. The interesting or indicating feature of these records is the relation between the minimum night rate, which is usually found between 12 and 3 a.m., and the total 24-hour consumption. A high night rate, unless accounted for industrially, means leaky fixtures or breaks in mains.

As the isolation of a section is apt to leave some industries just within and without the district short on water pressure, causing complaints of low pressure, a map is kept in the office of the superintendent of maintenance on which each valve closed is indicated by a red-headed pin. By this means one can at a glance determine if a complaint of lack of pressure is due to the pitometer work or to some other cause. These pins for closed valves are corrected each morning.

After the total measure of a district is made, subdivision work is started. Sub-division is the determination of the consumption block by block, and is always done at night. The pitometer is set at the gauging point and the district shut off block by block, the time of each shut-off being noted. By comparing the time with the consumption shown on the photo-chart at the corresponding time, the rate for each block can be determined. This is a very important feature of the pitometer work, as by comparing the consumption for the different blocks one knows immediately where the inspection of fixtures will give the greatest result. It is an especially valuable feature for the control of the house waste after a survey has once been made. By means of the pitometer and proper sub-division, house to house inspections can give results twice as quickly as though no pitometer were used, as efforts will be confined to blocks where the sub-division indicates the greatest results are to be obtained.

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* Water Commissioner of Buffalo, N. Y.

†Paper before American Water Works Association.

Immediately after the sub-division work was completed, inspectors were placed in the district and house to house inspection made.

To make the survey, an engineer in charge and four assistants were employed. Three trucks with gangs of four were constantly engaged and one clerk assigned to this work to keep the records. Twelve of the regular city inspectors made the house to house inspections. Later, as more of the city was covered, twenty temporary inspectors were engaged.

One of the assistant engineers made the district measurements, and two were constantly engaged on sub-division. One assistant engineer tested the meters and fire lines. During the winter months two men worked in the office.

### INSPECTION FOR HOUSE WASTE.

The inspection for house waste is of great value, and a large percentage of the total waste eliminated is directly due to inspection. However, proper control must be exercised or the results will be indifferent. From 1906 until 1915, the department employed men to stop house waste, but had no control over same by means of district measurements, and during this period the per capita consumption was practically stationary, although the annual consumption increased.

As the sub-divisions showed waste in practically every block, a system of inspection records was developed. Inspectors worked in pairs and a report on every house and service was made. Where leaks were discovered, a repair notice was left. Two weeks later a second inspection was made of all places where notice to repair was served. If repairs had not been made at that time, a second repair notice was left and a re-inspection was made three days later, at which time water was turned off, unless all plumbing was in good shape. The years of unlimited use and waste of water had rendered most people indifferent to the conditions of the plumbing in their houses and at first considerable complaints were made at the so-called arbitrary ruling of the bureau. However, these soon ceased as the results of the survey became apparent and in the majority of cases splendid co-operation was secured.

The inspectors first tested the house fixtures and then, if these were o. k., tested with the aquaphone at the curb-box for service leaks. If house waste was found, the stop-cock at the house was closed before testing for service leaks. On their inspection report blanks, leaks were listed as service, faucet, toliet, etc., and a notice showing the nature of the leak served. A record of the number of people on each service was also reported. After the house inspection in a district had been completed, a pitometer was again used to record the flow in different blocks in the sub-division. Where the night rate was still excessive, investigation for underground leaks was started. The determination of underground leaks is largely a matter of skill, judgment and experience. By sub-dividing by blocks, the leak can be located as to block, but then the operator must find same by skill and judgment. If service pipes and boxes have been installed, the aquaphone can give one the approximate location, and by driving a steel rod to the main, the leak can be located closely. In only a few cases was it necessary to excavate more than one hole to find the leak.

Probably the most difficult work in this line was on Northland avenue, in Section 3, where a night rate of 755,000 gallons was shown on one block. As there were practically no houses, and only one factory which was metered and this accounted for only a fraction of the flow, all indications pointed to a large joint leak, or cracked pipe. In this street the pipe is laid in the sewer trench, which was excavated through rock. When the street was paved in 1893, house services had been placed every sixty feet. No large main leak was encountered, but seven service leaks were discovered and shut off at the main, which accounted for 700,000 gallons, or practically the entire waste. The corporation cocks had in nearly every instance been destroyed and water was discharging directly into the sewer. No indications of these leaks appeared on the street surface.

### MAPS AND RECORDS.

As work was completed in each division, a permanent map was filed in the office, showing gauging points for instrument and valves on boundary points. On this map is recorded date of first measurement, 24-hour consumption and minimum night rate, and same record of second measurement. It is the intent of the Bureau of Water to continue the pitometer work as a special department, and regular measurements will be taken at varied intervals, and these maps will facilitate the work greatly. All inspectors' reports are filed by streets and can be referred to instantly.

As soon as a section was completed, a full report on same was submitted by the engineer-in-charge. This report gave a general summary of the work with certain specific recommendations to meet the conditions for the sections. These reports are filed so as to be available for future reference.

As an example: The report for Section 4 showed as follows:

| | |
|---|---|
| Total flow before inspection per 24 hours.. | 17,936,000 gallons |
| Minimum night rate.................... | 14,912,000 gallons |
| Per cent of night rate to total flow......... | 86.2% |

Inspection of all buildings on this section showed 3,444 leaky fixtures, divided as follows: Faucets, 1,064; Toilets, 2,380. It also disclosed 280 leaky services, which were repaired by the owners. Eight unfinished supplies, which were discharging into the sewers, were dug up and plugged. Also, one broken 6-inch main was uncovered and repaired.

After the house inspection and underground work had been completed, a re-measurement was taken with the following results: Reduction in daily consumption 3,780,000 gallons; reduction in night rate 3,910,000 gallons.

On account of the desire to reduce the pumpage as quickly as possible, so as to conserve coal as a war measure, no intensive work was attempted and the city was surveyed as rapidly as consistent with good work. It is highly probable that the results in this section could have been bettered had more time been devoted to it. However, by extending the work rapidly, large leaks in other districts were detected and stopped in time which might have been devoted to more intensive work in this section. It is expected that the work to be done in this section this summer will materially better the above result.

The efficiency of the survey as a means of reducing water consumption is shown by the monthly consumption chart. This shows a gradually increasing yearly consumption. In 1916-1917 the daily consumption was 168,000,000 gallons and had no effort been made to check this, the chart indicates for the present year a daily pumpage of 186,000,000 gallons. However, starting in July, 1917, which was co-incident with the start of the survey, each month shows a decrease in pumpage when compared with the same month in the preceding year, except for the extremely cold months of December, 1917, and January and February, 1918.

### INDUSTRIAL USE.

The legitimate household use is assumed at 50 gallons per capita per day. The industrial use is assumed to be our total metered use, as practically all industries are metered. This use is practically 100 gallons per capita per day. It is hard to account for such a large industrial use of water per capita in a city the size of Buffalo. In my opinion it is directly due to the low meter rate of 2c per M gallons, which for a long time was the charge here. This, in conjunction with a fairly high minimum charge for a meter, made the average metered service user indifferent to the amount of water used. The large consumer, as a rule, found it cheaper to waste water than to investigate for leaks. Buffalo is also a large railroad center and the city supplies them all with water. In 1917 the meter rate was raised to 4c per thousand gallons.

### DURATION OF RESULTS.

Our first section was surveyed in 1917, and this year remeasurements have been taken. These show that there is a more or less gradual return to the waste first eliminated, depending wholly on the character of dwellings. In all sections, however, the consumption was less than it was two years ago at the time of the first measurement. In one case the result showed only a slight increase over the first remeasurement. I estimate that effects of the result of the survey will continue from one to three years, so far as house waste is concerned. All underground leaks stopped are a permanent saving.

In the sections completed, the house waste stopped is estimated at 18,000,000 gallons, while the underground waste stopped was 12,000,000 gallons by actual measurements.

It is our intention to measure and sub-divide the entire city once in two years, and to completely inspect as often. Of course, measurements and inspections will be made oftener in the sections where waste is greatest. To more fully control waste in these sections, meters will be placed gradually.

However, to quickly reduce our pumpage was imperative. I know of no other way which would have given results so quickly. To install meters would have taken from three to five years and the reduction would not have been felt for some time—at least not until after the bill for the first six months had brought the waste of water home very forcibly to the householder.

### RESULTS OF SURVEY.

Nine-tenths of the city has now been covered by the survey, with the following results:

33,278 leaky fixtures reported and repaired; 1,860 leaky services reported and repaired; 52 unfinished supplies found wasting 3,587,000 gallons per day; broken mains and leaky joints wasting 4,376,000 gallons per day found and repaired.

The services, broken mains, unfinished supplies and leaky joints repaired account for 12,000,000 gallons waste per day permanently stopped.

The pumpage has been reduced, except in times of extremely hot or cold weather, to less than 125,000,000 gallons per day, as compared to over 160,000,000 gallons per day in 1917. Figuring the cost of pumping at $6.24 per million gallons, the average cost for the last three years, the annual saving is $68,328. Against this is the estimated charge of $25,000 per year to maintain the Pitometer Division of the Bureau, including the pay of temporary inspectors, who will be employed each spring.

To date, the survey has cost $96,931, much of which represents investment in equipment and records or for professional services.

From the survey made and results obtained, it is evident that to a certain extent the house waste can be greatly reduced by house inspection controlled by pitometer measurements. When used in conjunction with selection metering, the most flagrant house waste can be eliminated and the consumption reduced nearly to that obtained by universal metering and at less expense. The pumpage can be reduced at least 20,000,000 gallons by the installation of 10,000 meters on house services where tremendous waste has been found by the survey. The installation of these meters is now proposed. A further reduction is not deemed advisable until a filtration plant is built.

### SURVEY VS. METERING.

A comparison between the cost of universal metering and the elimination and control of waste by the pitometer and selective metering is, briefly, as follows:

| | |
|---|---|
| Control by Pitometer and Selective Metering: | |
| Annual cost of inspection | $ 25,000 |
| Installation of 10,000 meters, investment in meters. | 100,000 |
| Annual charge on meters, interest at 4½ % | 4,500 |
| Depreciation, 4% | 4,000 |
| Cost of reading and maintenance | 6,000 |
| Total Annual Cost | $ 39,500 |
| Universal Metering: | |
| Installation of 75,000 meters, investment in meters. | $750,000 |
| Annual charges on meters, interest at 4½ % | 33,750 |
| Depreciation 4 % | 30,000 |
| Cost of reading and maintenance | 45,000 |
| Total Cost | $108,750 |
| Annual saving in favor of pitometer control | $69,250 |

It is true that universal metering would reduce the consumption considerably more than the other method; but even if the reduction amounted to 20,000,000 gallons per day, the saving in operation costs would not equal $69,250 per year.

The efficiency of any instrument is determined by how well it does what it is intended to do. If the object had been to reduce the consumption to a minimum, the proper thing would have been to install meters and then eliminate underground waste by pitometer investigation. However, in any large water works, there are certain features peculiar to it alone. For instance, the Buffalo water works had, at the time a reduction in pumpage was decided upon, two pumping stations capable of each supplying 150,000,000 gallons of water a day with mains properly built for distributing same. If the pumpage is reduced to 110,000,000 gallons of water a day for nine months of the year, one plant can be shut down for that period. After that saving has been effected, a further reduction in pumpage saves very little per million gallons pumped, as practically the same force is required to operate the plant whether 75,000,000 or 120,000,000 gallons is pumped; and, irrespective of the pumpage, interest on the bonds accrues.

Our intention was to reduce by this survey our pumpage from 159,000,000 gallons to less than 115,000,000 gallons and before the work is completed this result will have been attained. Moreover, the data have been furnished so we know how to further reduce the consumption by intensive inspection and the installation of meters in certain districts.

# WATER RATES AND FIRE PROTECTION CHARGES

**Data from Several Hundred Cities of the United States—Maximum and Minimum Rates—Changes Since Before the War—Receipts for Public Hydrants and Private Fire Protection.**

### FREE WATER.

Comparatively few cities reported giving any amount of free water to private consumers; the most notable exception being Hudson, N. Y., which makes no charge for water except that used for commercial purposes, but pays the maintenance costs and retires the bonds from the general tax levy—believed to be the only city in the United States that does this.

Free water for building sidewalks is furnished by Lodi, Cal. For constructing buildings by Reading, Mass.; for a short time in new buildings by Watseka, Ill., and Mt. Clemens, Mich.; for sprinkling parking in sidewalk strip

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### METER RATES AND FIRE PROTECTION (Continued).

| City and State. | Municipal or Private. | Rate. | For consumption less than Maximum Meter Rates. | Minimum Meter Rates. |
|---|---|---|---|---|
| **Indiana:** | | | | |
| Bluffton | Municipal | ........ | ........ | ........ |
| Brazil | Municipal | 18c. per 100 cu. ft. | 401 cu. ft. | 4½c. per 100 cu. ft. |
| Columbus | Municipal | 20c. | 10,000 | 6c. |
| Decatur | Municipal | 25c. per M | 15,000 | 15c. per M |
| Evansville | Municipal | 20c. per M | ........ | 5c. per M |
| Goshen | Municipal | 11c. per 100 cu. ft. | 3,000 cu. ft. | 6c. per 100 cu. ft. |
| Greensburg | Private | 35c. per M | 15,000 | 12c. |
| Huntington | ........ | 20c. per 100 cu. ft. | 1,400 cu. ft. | ........ |
| Jeffersonville | Private | 40c. per M | 1,000 per day | 8c. per M |
| Kendallsville | Municipal | 25c. per M | 5,000 gals. | 10c. per M |
| Knightstown | ........ | 20c. | 2,500 | 6c. |
| La Porte | Municipal | 10c. | 30,001 | 4c. |
| Lebanon | Municipal | 25c. | ........ | 14c. |
| Linton | Private | 35c. per M | ........ | 10c. per M |
| Madison | Municipal | 20c. per M | 7,501 gals. | 8c. per M |
| Mishawaka | Municipal | 10c. per 100 cu. ft. | 8,000 cu. ft. | 4¾c. per 100 cu. ft. |
| New Castle | Municipal | 15c. per M | 15,001 gals. | 6c. per M |
| North Manchester | Municipal | 15c. per M | 50,000 gals. | 8c. per M |
| Plymouth | Municipal | 15c. per M | ........ | 15c. per M |
| Richmond | Private | 20c. per M | 10,001 gals. | 5¾c. per M |
| Seymour | Private | ........ | ........ | ........ |
| South Bend | Municipal | 9c. per 100 cu. ft. | 10,301 cu. ft. | 6c. per 100 cu. ft. |
| Terre Haute | Private | 25c. per M | 20,001 gals. monthly | 5¾c. per M |
| Tipton | Municipal | 12c. per 100 cu. ft. | 6,000 cu. ft. | 6c. per 100 cu. ft. |
| Valparaiso | Private | 20c. per 100 cu. ft. | 1,200 cu. ft. | ........ |
| West Lafayette | Private | 30c. | 500 daily | ........ |
| **Iowa:** | | | | |
| Atlantic | ........ | 30c. per M | ........ | 10c. |
| Boone | Municipal | 50c. per 100 cu. ft. | 401 cu. ft. per quarter | 8¼c. per 100 cu. ft. |
| Burlington | Private | 25c. per M | ........ | 10c. per M |
| Cedar Falls | Municipal | 22½c. per 100 cu. ft. | 500 cu. ft. | 5c. per 100 cu. ft. |
| Fort Madison | Private | 40c. per M | 5,000 gals. | 10c. per M |
| Maquoketa | Municipal | 16⅔c. per M | 15,001 in 6 months | 10c. per M |
| Marion | Private | ........ | 501 cu. ft. | 10c. |
| Marshalltown | Municipal | 40c. per M | 1,000 gals. per month | 7½c. per M |
| Mason City | Municipal | 40c. per M | 15,001 gals. | 10c. per M |
| Muscatine | Municipal | 25c. per 100 cu. ft. | ........ | 8c. per 100 cu. ft. |
| Osceola | Municipal | 50c. per M straight | ........ | ........ |
| Sioux City | Municipal | 25c. per M | 10,001 gals. per month | 10c. per M |
| Washington | Municipal | 40c. per M | 15,000 | 15c. per M |
| **Kansas:** | | | | |
| Atchison | ........ | 60c. | 32,001 | 30c. |
| Chanute | Municipal | 20c. per M | 10,000 gals. | 6c. per M |
| Cherryvale | Municipal | 50c. per M | 1,001 per month | 12c. per M |
| Clay Center | ........ | 25c. per M | 50,000 gals. | 7½c. per M |
| Council Grove | Municipal | 30c. per M | ........ | ........ |
| Emporia | Municipal | 25c. per M | 2,000 per month | 6c. |
| Fort. Scott | Municipal | 25c. per M | 4,000 gals. | 9c. |
| Fredonia | Municipal | 25c. per M | 3,000 per month | 10c. |
| Great Bend | Private | 30c | 5,000 | 12½c |
| Hiawatha | Municipal | 40c per M | 501 per day | 15c per M |
| Holton | Municipal | 60c per M | 1,000 per month | 10c per M |
| Horton | Municipal | 50c per M | 7,500 per quarter | 30c per M |
| Independence | Municipal | 23c per M | 3,000 | 6c per M |
| Iola | Municipal | 15c per 100 cu. ft. | 250 cu. ft. per month | 4½c per 100 cu. ft. |
| Larned | Municipal | 75c | 1,000 | 10c |
| McPherson | Municipal | 25c | 2,000 | 8c |
| Manhattan | Municipal | 15c per 100 cu. ft. | 8,000 cu. ft. per quarter | 5¼ per 100 cu. ft. |
| Neodesha | ........ | 25c per M | 3,000 | 15c per M |
| Osage City | Municipal | 30c per M | ........ | 25c per M |
| Osawotomie | Municipal | 30c per M | 5,000 | 8c |
| Ottawa | Municipal | 25c per 100 cu. ft. | 400 cu. ft. per month | 4½c per 100 cu. ft. |
| **Kentucky:** | | | | |
| Bowling Green | Municipal | 20c per 100 cu. ft. | 1,000 cu. ft. | 4½c per 100 cu. ft. |
| Frankfort | Private | 30c | 5,000 daily | 6c |
| Hopkinsville | Private | 30c per M | 1,001 daily | 12½c per M |
| Lexington | Private | 25c | 25,000 | 10c |
| Louisville | ........ | 15c per M | 5,001 | 4.1c per M |
| Marysville | Private | 40c per M | 501 per day | 10c per M |
| Paris | Private | 25c | 1,001 | 16c |
| Somerset | Private | 30c per M | ........ | ........ |
| **Louisiana:** | | | | |
| Kentwood | ........ | ........ | ........ | ........ |
| New Iberia | Municipal | 15c per M | 50,001 | 10c per M |
| Shreveport | Municipal | 25c per M | 50,001 per month | 8c per M |
| **Maine:** | | | | |
| Bangor | Municipal | 25c per 100 cu. ft. | 1,200 cu. ft. per quartr | 5c per 100 cu. ft. |
| Caribou | Private | 7½c per 100 cu. ft. | ........ | ........ |
| Eastport | Private | 45c per M | Domestic | 30c per M |
| Gardiner | Water district | ........ | ........ | ........ |
| Houlton | Private | 35c per M | ........ | ........ |
| Lisbon Falls | Municipal | ........ | 210,001 | 25c per 100 cu. ft. |
| Rockland | Private | 25c per M | 1,201 per day | 16c per M |
| South Paris | Municipal | 25c per M | ........ | 9c per M |
| Sanford | Private | ........ | ........ | ........ |
| Van Buren | Municipal | ........ | ........ | ........ |

## METER RATES AND FIRE PROTECTION (Continued).

| City and State. | Minimum Meter Rates For consumption more than | Increase since before the war. | City pays for fire hydrants. | Charge for private hydrants or sprinklers. |
|---|---|---|---|---|
| **diana:** | | | | |
| Bluffton | ........ | Before Utility Board at present | $70 per year includes flushing and all city bldgs. | None |
| Brazil | 10,000 cu. ft. | None | $42.50 | Have none |
| Columbus | ........ | About 20% | $50 per year | Front foot scale |
| Decatur | ........ | None | $40 per year | All on meter |
| Evansville | ........ | Ranges from .01c. to 10c. | $17,380 per year | None |
| Goshen | 60,000 cu. ft. | Old rate was 10c. per 1,000 gal. | $40 per year (cash) | None |
| Greensburg | 120,000 | 20% | $55 each | None |
| Huntington | ........ | None | $40 each per year | None |
| Jeffersonville | 4,000,000 per month | None | $9,000 per year | All on meters |
| Kendallsville | 30,000 gals. | None | Nothing | None |
| Knightstown | 100,000 | None | $25 per year | Have none |
| La Porte | 210,000 | None | $34.50 each | Fire protection service—4-inch, $8; 6-inch, $10 per month |
| Lebanon | 450,000 | Minimum from 10c to 14c | $50 | None |
| Linton | ........ | 25% surcharge | $70 per year | No sprinklers |
| Madison | 500,000 gals. | None | Nothing | ........ |
| Mishawaka | 20,000 cu. ft. per quarter | About 12% | $37.50 | 1-inch, $2, to 8-inch, $20 per quarter |
| New Castle | 1,500,000 gals. | None | $45 each, cash | None |
| North Manchester | 1,000,000 gals. | None | $25 each per year | None |
| Plymouth | ........ | None | Nothing | None |
| Richmond | 10,000,000 gals. | None | $55 each | 1-inch, 75c; to 6-inch, $10 per month; $25 per hydrant if independent of fire line |
| Seymour | ........ | Under consideration | $45 for first 100, then $35 | $50 per year where sprinkler system is installed |
| South Bend | 21,300 cu. ft. | None | $40 per year | $10 per month for service |
| Terre Haute | 3,000,000 monthly | From 20c to 25c for small consumers | $50 each per year | 4-inch, $22.50, to 2-inch, $9 per month |
| Tipton | 10,000 cu. ft. | None | $25 per year | Have none |
| Valparaiso | ........ | None | $50 | None |
| West Lafayette | ........ | None | $45 | $45 |
| **wa:** | | | | |
| Atlantic | ........ | None, but proposed. | $15 per year by water tax | ........ |
| Boone | 100,000 cu. ft. per quar. | (c) | Nothing | None |
| Burlington | ........ | None | 5-mill tax on all property in water district | $24 per year for each 6-inch connection |
| Cedar Falls | 40,000 cu. ft. | None | Nothing | None for hydrants; nominal charge for sprinklers |
| Fort Madison | 500,000 gals. | None | $40 per year | Have none |
| Maquoketa | 15,000 in 6 months | None | Nothing | Have none |
| Marion | 3,750 cu. ft. | 10% | $50 per year | None |
| Marshalltown | 1,500,000 gals. per mo. | None | Nothing | Pay for installation |
| Mason City | 1,000,000 gals. | None | $35 | None |
| Muscatine | ........ | None | Interest on bonds | $50 per year |
| Osceola | ........ | None | ........ | All metered |
| Sioux City | 250,000 per month. | None | Nothing | None |
| Washington | 150,000 | None | Nothing | None |
| **ansas:** | | | | |
| Atchison | 30,000 | None, but proposed | $6,070 for 178 hydrants | None |
| Chanute | 35,000,000 gals. | None | $30 each per year | None |
| Cherryvale | 5,000 per month | 30% | Nothing | Have none |
| Clay Center | 1,000,000 gals. | 25% | $40 each per year | ........ |
| Council Grove | ........ | Proposed to establish minimum rate | Has paid $65.95 each per year | No private sprinklers |
| Emporia | 5,000,000 per month | None | $60 each per year | None |
| Fort Scott | 400,000 gals. | Commercial, 25c plus .08 to 27½c plus .09 | $30 each raised from $20 | None |
| Fredonia | 300,000 per month | None | Nothing | None |
| Great Bend | 200,000 | None; applied, but request not considered | $40 per year | ........ |
| Hiawatha | 10,000 per day | ........ | Nothing | None |
| Holton | 40,000 per month | None | $1,650 | Have none |
| Horton | 22,500 per quarter | 10% | $20 each per year | None |
| Independence | 500,000 | None | None | None |
| Iola | 300,000 per month | None | $306.64 per month | No private fire hydrants |
| Larned | 1,000 | From $1.50 to $2.25 minimum per quarter | $2,500 for 110 hydrants | Regular rates |
| McPherson | 51,000 | None | $240 per year | None |
| Manhattan | 100,000 cu. ft. per quar. | None | $30 each per year | None |
| Neodesha | 50,000 | None | Nothing | None |
| Osage City | ........ | None | Nothing | Meter rate |
| Osawotomie | 1,000,000 | None | Nothing | None |
| Ottawa | 100,00 cu. ft. per month | None | $42.50, $40 and $15 each | None |
| **ntucky:** | | | | |
| Bowling Green | 7,500 cu. ft. | None | Nothing | Metered service |
| Frankfort | 5,000 daily | ........ | $6,250 for first 100 and $50 all over | ........ |
| Hopkinsville | Mfg. rate | None | $30 and $40 per year | $10 to $60, according to size |
| Lexington | 500,000 | None | $50 per year | $150 per year for 4 connections |
| Louisville | 50,000 per day | None | Nothing | $25 per year for 6-inch, to be used only in case of fire |
| Marysville | 2,000,000 | None | City paid $65,000 for perpetual protection | $25 to $40 per year |
| Paris | 10,000 | 20% reduction before war. Re-established old rates | 120 hydrants at $30 each | Meter and $50 per year flat rate |
| Somerset | ........ | None | $50 each per year | Have none |
| **uisiana:** | | | | |
| Kentwood | ........ | None | Nothing | None |
| New Iberia | 50,000 | None | $4 each per year—on paper | $2 each per year—on paper |
| Shreveport | 500,000 per month | None | $40 each per year—same refunded | $10 per year for each opening not over 2-inch. Sprinkler system, $35 per year minimum for 700 heads; each additional 5c |
| **ine:** | | | | |
| Bangor | 100,000 cu. ft. per quar. | None | $12,000 for all departments | Hydrants, $30 |
| Caribou | ...... | 25% pending before P. W. commissioners | $1,650 per year | $6.25 per season |
| Eastport | Mills and factories | None | $4,000 | $75 for hydrants; no charge for sprinklers |
| Gardiner | ........ | None | $40 each per year | $50 per hydrant per year |
| Houlton | ........ | None | $50 each for first 50. $25 each for all over | Hydrants same as town |
| Lisbon Falls | 210,000 | None | $2,960 per year | None |
| Rockland | 20,000 gals per day | None | $35 each | $35 per hydrant |
| South Paris | ........ | None | $35 each | None |
| Sanford | ........ | None | $33.33 each | None |
| Van Buren | ........ | None | $40 each per year | None |

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(c) Old rate, 2,250 gal. or less, $1.50; over 90,000 gal. per quarter, 10c.

free water by Fort Morgan, Colo., reduced rate by Walla Walla, Wash., and 400 cu. ft. per month by Wenatchee, Wash.

By far the greatest number of instances of free water is for charitable and semi-public institutions. Churches are supplied by Washington, D. C., Marshalltown, Ia., Fredonia, Kans., Bowling Green, Ky., Houghton, Mich., Harrison, N. J., Norwich, N. Y., Catasauqua, Pa. (20 per cent less than rate), East Stroudsburg, Pa., Lewistown, Pa., Aberdeen and Rapid City, S. D., Hillsboro, Tex., and Pullman, Wash. Parsonages are also included by Marshalltown and Houghton. "Charitable institutions" by Washington, D. C., Savannah, Ga., Shreveport, La., Springfield, Mass., Atlantic City, N. J., Ogdensburg, N. Y., Syracuse, N. Y. (90 per cent reduction) and Memphis, Tenn. Marietta, Ga., supplies a church cemetery; Peru Ill., hospitals; Marshalltown, Ia., Y. M. and Y. W. C. A. and cemetery (the latter using many million gallons a year); Holton, Kans., Red Cross and rest room; Bay City, Mich., hospitals, Y. M. C. A., etc.; Battle Creek, Mich., to a very few semi-public; Muskegon, Mich., to parks and cemeteries; Newport, N. H., to cemeteries, libraries, hospitals, etc.; Ashland, O., to the Children's Home; Lakewood, O., to hospitals.

Charity customers are carried by Commerce, Ga., Manistee, Mich., St. Joseph, Mich., Eveleth, Minn. (widows only), Bellefonte, Pa., Fayetteville, Tenn., and Temple, Tex.

Quite a number make no charge for private fire connections; but this involves practically no water, except where it is taken surreptitiously from unmetered services (which form of stealing is apparently quite common, if we may judge from the number of cases unearthed by waste surveys).

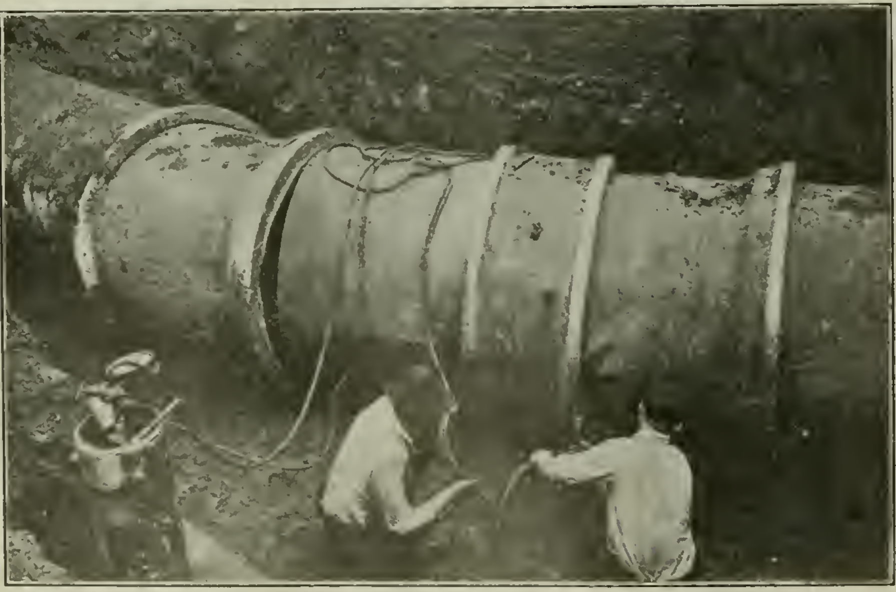
## ANOTHER PIPE BEND FAILURE.

Last week we described a break in a Milwaukee 30-inch water main at a 45-degree bend at a river crossing. Our attention has been called to a similar happening at Wilmington, Delaware, about three years earlier, where a 48-inch main broke open at a 45-degree bend at a stream crossing. This is described as follows by Edgar M Hoopes, Jr., chief engineer of the Wilmington Water Department:

"On the afternoon of August 9, 1915, a joint in the 42-inch cast iron forcing main failed at a point about 35 feet west of Brandywine pumping station. The first evidence of trouble appeared on the afternoon of the day previous, when water was discovered on the pumping station lawn directly over the pipe. The following morning the line was uncovered at the top, and found to be leaking at the bell end of a 45-degree bend. This elbow was located at the point where the pipe deflects before crossing Brandywine creek at the west side of Market street bridge. An effort was made to caulk the pipe under pressure, but while the work was in progress, the entire joint pulled apart—the caulkers and several laborers having narrow escapes from drowning. The check valves at the end of the line (Porter reservoir) held, but the contents of the pipe flooded the pumping station to a depth of nearly five feet, and completely uncovered several sections of the pipe near the broken joint.

"An investigation disclosed that a short piece of plain end pipe had been used between the elbow and a sleeve connecting the line with the discharge side of the pumps (see illustration), and that the joint so made had pulled apart. All other joints for three pipe lengths on either side of the elbow also pulled out at the bells—varying in amount from three to five inches. The main at the point of failure was under pressure of 115 pounds per square inch, and no bracing of any kind had been used to support the pipe at the elbow. Sixty hours of continous work were required to complete a repair and during this period no water could be pumped to Porter reservoir. The accident occurring coincident with the season of greatest consumption, a water shortage was averted by mere good fortune. The nature of the failure clearly illustrates the necessity of bracing all bends under pressure to overcome the outward thrust. Softening of the material around the pipe, with resulting freedom of movement, was the direct cause of the failure. A concrete pier supporting the elbow is now preventing a recurrence of the accident."

As shown in the second illustration, the new joints were braced against the bank, and the whole—braces and all—was then surrounded and encased with concrete, this being especially advisable in this case because of the softness of the soil.



FAILURE AT ELBOW IN 48-INCH FORCE MAIN.

PIPE REPAIRED AND BRACED.

# The WEEK'S NEWS

**$40,000,000 Road Bond Issue for California—States Rush for Federal Road Aid—Holyoke's Municipal Power Plant to Buy Energy—Philadelphia's Government to Be Improved by Bequest—$22,000,000 Bond Issues for Pittsburgh—Toledo Street Railways Must Vacate Street—Higher Fares in 389 Cities—Comfort Stations Must Be Provided by Wisconsin Cities.**

## ROADS AND PAVEMENTS

### California's $40,000,000 Bond Issue Enthusiastically Carried.

Sacramento, Cal.—With an affirmative majority in every precinct in the state and a majority reaching 7 to 1, the big $40,000,000 road bond issue was approved by the voters at the recent election. This is the third bond issue for highways authorized in California and makes a total of $73,000,000 for this purpose in the last decade. By this bond issue the completion of the present state highway system and the construction of many new highways distributed throughout the state in such a manner as to round out the present system and to adequately serve the entire state is provided for. The state system has 4,500 miles of highways.

### States Quickly Accept Federal Aid.

Washington, D. C.—The Highway Engineering Bureau of the Department of Agriculture recently analyzed the applications for Federal road aid made in April, and found that all past records have been surpassed. For example, the projects approved from one state, Pennsylvania, call for Federal aid to the amount of $1,444,697.54 in the building of nine roads having an estimated cost of $2,516,628.69. A single project in Illinois approved will cost $1,636,445.50, and will receive $818,222.75 of federal money. An Allegany county (Maryland) project approved, for a concrete road 4.68 miles long, will cost $56,817 a mile. Approved statements and agreements together called for $9,559,571.30 of Federal aid for roads having an estimated cost of $20,861,957.9 . The number of projects was 174, as against 150 in March. The mileage was 1,443.76 as against 1,270.13. The increases over the March record are: Number of projects 24, mileage 173.63, estimated cost $3,302,347.89, federal aid allowance $2,819,732.13. The statements approved during the month were 120, with a mileage of 923.53. The estimated cost of this mileage was $16,261,326.51, as against $14,425,114.87 for the projects approved in March, and by far the largest amount yet reached in a monthly record since federal aid for roads became an accomplished fact. The federal aid allowance for these projects was $7,528,550.68, an increase over that for the previous month of $2,066,393.96. Agreements for fifty-five projects were signed by the Secretary of Agriculture. All but one were for projects approved in previous months. The federal aid allowed for these projects was $2,039,614.99, and the estimated cost of the roads $4,626,415.48. The total federal aid agreements executed up to May 1, 1919, number 535, with a milegae of 4,624.83. The estimated cost amounts to $39,059,327.44, and the federal aid allowance to $15,614,929.61. In five states the cost of the new projects approved will be in excess of $1,000,000, while in six other states the estimate cost runs from $576,000 to $908,000. The federal aid allowance in these states runs from $296,000 up, in four of them being more than $500,000. In several of them the agreements executed greatly increase the estimated cost and the amount of federal aid for projects which were considered during the month. The Pennsylvania projects mentioned, which in their estimated cost and federal aid allowance so far tops the record for all the states to date, have an aggregate mileage of 57.81, and nearly all are for concrete roads. These states follow in the order named in the relative cost of the roads involved in the approved contracts: Georgia, 16 projects, 103.91 miles, estimated cost $1,837,446.21. Federal aid $873,182.05; Illinois, a single project, 65 miles long, estimated cost $1,636,445.50, federal aid $818,222.75; Ohio, 7 projects, 35.36 miles long, cost $1,241,677.02, federal aid $387,600; Connecticut, 1 project, 32.1 miles, estimated cost $1,002,650, federal aid $501,325; Maryland, 7 projects, 23.93 miles, estimated cost $908,347.77, federal aid $413,821.38; California, 3 projects, ?0.69 miles long, estimated cost $834,?39.02, federal aid $448,969.51. The month's record shows the South moving forward in the road building campaign, with projects showing higher grade construction. Of the sixteen Georgia projects approved two were for bridges, seven for concrete and one for either a brick, concrete, or bituminous road, the others being for sand-clay roads. The concrete roads will cost from $30,000 to $32,000 a mile, indicating the highest type construction.

## STREET LIGHTING AND POWER

### Commission Disapproves of Rate Comparisons.

Indianapolis, Ind.—In denying a petition for reduction in the hot-water-heating rates of the Merchants' Heat & Light Company, Indianapolis, the state public service commission critized the practice of comparing rates. On this subject it said: "Testimony introduced by petitioners is that at two points in Indiana and Wisconsin, lying north of Indianoplis and subject to longer winters and more severe weather conditions, rates are materially lower than respondent's rates for like service. Comparisons of rates for like service in other cities may or may not be of value, but in no case are such comparisons controlling. Each rate considered is governed by conditions that are individual to it. Petitioners did not present for comparison rates higher than are charged in Indianpolis, both in this state and Wisconsin, whose reasonableness, under the unprecedented conditions existing, has not been challenged."

### Municipal Plant May Buy Energy.

Holyoke, Mass.—The municipal electric plant which has been operated by the city since 1902 has reached a point where the purchase of energy from the Turners Falls Power & Electric Company is being considered as the most economical means of meeting future demands. In the past sixteen years the number of customers has increased from 273 to 7,510, and the energy output has risen from 1,286,790 kw.-hr. to 20,699,000 kw.-hr. The population of the city is now about 75,000. It appears that if the present policy of producing energy locally is to be continued, a large outlay will be required in the near future for the construction of a new station, owing to limitations of the presnt site and the inadequacy of the condensing water supply during the period of annual shut-down of the power canals in the city and also at times when the Connecticut River is low. At such times it has become necessary to discontinue service to some of the largest customers. In a letter to the mayor and aldermen, John J. Kirkpatrick, manager of the gas and electric department, points out that of a total of thirty-nine municipal plants in Massachusetts, twenty-nine are purchasing energy, and this proportion is steadily increasing. While the output has increased 50.5 per cent. since 1915, the cost of coal has risen 232 per cent., or from $62,000 to $206,000. The Turners Falls company has offered to supply energy at a price which it is estimated will save the city more than $50,000 per year for the first five years, and nearly $100,000 per year for ten years. These rates range in base from 1.2 per cent. to 0.8 per cent. per kilowatt-hour, with further adjustment varying with the cost of coal at the Hampden steam plant of the Turners Falls company at Chicopee Junction, Mass. The coal differential includes an adjustment providing for increase as the average cost of coal exceeds $5 per gross ton between July 1 and Dec. 31 of any year, with corresponding reductions below $4. S. H. Mildram, consulting engineer and accountant, Boston, has submitted a report on the cost of manufacture versus purchase. In his letter of transmittal manager Kirkpatrick states that the present proposal, in addition to the apparent advantages offered, is in conformity with the policy of consolidation and conservation of the coal supply which is being advocated so strongly by the national Government, and that the proposition is transmitted "with an absolute knowledge that there is no central station in Massachusetts purchasing guaranteed power under more favorable terms." It is not intended to abandon the policy of municipal lighting if the proposal of the Turners Falls company is accepted.

## GOVERNMENT AND FINANCE

### New Jersey Franchise Taxes Increase.

Trenton, N. J.—The municipal franchise tax assessed against utility corporations in New Jersey this year will amount to $2,991,334.23, according to a statement issued by the State Board of Taxes and Assessment. This is an increase of $722,367.91 over 1918. The assessment is made upon returns from utilities and individuals holding municipal franchises. The tax was levied against 294 corporations and three individuals. The companies and the amount of tax assessed are classified as follows:

| Classification | Number | Tax |
|---|---|---|
| Street railway | 29 | $ 950,918.50 |
| Water | 114 | 188,974.33 |
| Gas and electric | 103 | 1,416,929.89 |
| Telegraph and telephone | 35 | 429,249.87 |
| District telegraph | 3 | 3,495,69 |
| Sewer and pipe line | 16 | 12,574.15 |
| | | $2,991,334.83 |

### Will Provides Funds for Better City Government.

Philadelphia, Pa.—The provisions of the will of the late Thomas Skelton Harrison which created a stir throughout the city have been made public. The investigation of municipal affairs, the dissemination of information designed to improve the government of the city, the furtherance of measures for the immediate improvement of the bookkeeping and accounting of the city, the enforcement of Philadelphia city contracts, and the prosecution and punishment of the violators of any such contracts or of peculators of city funds are some of the specfic objects to which the income from the residuary estate is to be devoted. The will states the purposes to be:

1. To secure the honest and impartial enforcement of the terms of all contracts made by the City of Philadelphia providing for the furnishing by contractors of labor, or for the erection of buildings, the construction of public improvements, the cleaning of streets, the removal of refuse, including the proper method of carting ashes and garbage, etc., the furnishing of water, gas, electricity or transportation facilities or the performance of any other work, or the furnishing of any other supplies of any kind or nature for the said city.

2. To obtain the prompt prosecution of and just punishment of all persons guilty of violating contracts with said city or of peculation from its funds either directly or indirectly.

3. To investigate municipal affairs in the City of Philadelphia, and obtain and disseminate information in relation thereto, to aid the officers of departments of the city by advice as to the methods of municipal work, to frame proper legislation in regard thereto, and to aid in the inauguration or conduct of movements for municipal reform and generally for such purposes as will contribute toward the improvement of governmental conditions in the City of Philadelphia.

4. To assist in any special investigation in aid of any special public movement, in the investigation of any department of the city, to assist in the prosecution of any class of frauds or crimes, including frauds against the election laws, and in any other public service that they may deem proper.

5. To further the immediate adoption by the City of Philadelphia of a wise, clear and accurate system of bookkeeping and accounting, including as a feature thereof the frequent publication of lucid statements as to its financial condition.

6. But it is my will that the funds at the disposal of said board shall never be used to further the interests of any political party, or to secure the election of any officer of the municipal government, or for any similar purpose, it being my intention that this fund shall be used for the express purposes of this trust, and not as an instrument of partisan politics, for which reason I have endeavored to have the trustees selected by the most representative and public spirited corporate bodies of the City of Philadelphia.

The seven trustees of the bequest are to be named one each by the Franklin Institute, the Law Association of Philadelphia, the College of Physicians, the City Club of Philadelphia, the Board of Trade, the Board of City Trusts, the University of Pennsylvania. The trust fund is expected to amount to between a half million and a million dollars.

### Pittsburgh Approves $22,000,000 Bond Issues.

Pittsburgh, Pa.—The voters approved a bond issue amounting to $22,000,000 at the recent special election. The money is to be used for street repairing and improving, a street car loop subway, parks and playgrounds, water extension, sewer extension, hospitals and bridges. The biggest item in the list is a $6,000,000 street car subway in the downtown district. Another is Monongahela Boulevard, a roadway along the north bank of the Monongahela River from Grant St. and Second Ave. east to Craft Ave., to cost about $2,000,000. Widening Second Ave. between Liberty Ave. and Grant St. from 50 ft. to 80 ft. is included at $1,410,000. Nearly $1,500,000 is to be spent on improvement of the water system, including $490,000 for machinery in five pumping stations, $87.000 for renewals at the filtration plant, $90,000 for relining the Herron Hill reservoir, $400,000 for meter extensions, and $319,000 for pipeline extensions. Minor items in the list are $120,000 for six public comfort stations, and $600,000 for acquiring park lands in Sawmill Run Valley and at other points, and for park development.

## TRAFFIC AND TRANSPORTATION

### City Orders Car Company to Vacate Streets.

Toledo, O.—The city council has passed an ordinance requiring the Toledo Railways & Light Company, a subsidiary of the Cities Service Company, to vacate the streets over which the railway lines of the company operate by Aug. 1, this action affecting only the railway department of the company, and not in any way interfering with the operations of the electric light and power or gas departments. The passing of this ordinance followed the action of the Toledo Railways & Light Company in increasing fares from 5 cents and 1 cent for transfers to 6 cents and 2 cents for transfers. This increase was rendered necessary by the award of the Federal War Labor Board increasing wages of employes of the railway department of the Toledo Railways & Light Company. Through the Toledo Traction, Light & Power Company, the Toledo Railways & Light Company is an operating subsidiary of the Cities Service Company, but it has been stated at the offices of Henry L. Doherty & Company that this action by the Toledo City Council will not be detrimental in any way to the income of the Toledo Traction, Light & Power Company, or of the Cities Service Company. For some time the railway department at Toledo has furnished transportation facilities to the city of Toledo and suburbs at a loss.

### 389 Cities Pay Higher Car Fares.

New York, N. Y.—According to data compiled by the American Electric Railway Association, 389 cities, having more than 55 per cent. of the urban population of the country are now paying increased rates. Of this total, 29 cities are paying a 10-cent fare; 19 an 8-cent fare; 100 a 7-cent fare, 17 of which pay in addition 1 cent for each transfer; and 164 are paying a 6-cent fare. Fares in the remainder have been increased either by a reduction in the length of the zones, the adoption of a zone system, the abolition of reduced rate tickets, or a charge for a transfer. The fare situation throughout the country is summarized in the following table:

| | No. of Cities | Per Cent of Urban Pop. of U. S. | Average Population |
|---|---|---|---|
| Total number of cities in which increases were granted. (Population for four cities missing | 388 | 54.75 | 60,366 |
| Granted since Jan. 1, 1918. (Population for four cities missing | 347 | 50.82 | 62,653 |
| Granted prior to Jan. 1, 1918 | 41 | 3.93 | 41,015 |

Note.—The population figures used in this summary are the U. S. Census figures for July 1, 1917; the estimated urban population is 42,778,287. The total number of cities given (389) is the sum of cities in which fare increases were granted and excludes four duplications.

The nature of the increases in fare is shown in the following table:

| | No. of Cities | Average Population |
|---|---|---|
| Cities in which the fare was increased to 10 cents cash; ticket fare, 7 cents for city zone; 5 cents in each two-mile suburban and interurban zone; minimum fare, 10 cents | 23 | 44,464 |
| **Cities in which the fare was increased to 8 cents | 19 | 75,600 |
| Cities in which the fare is 7 cents and 1 cent charge for each transfer | 17 | 91,958 |
| Cities in which the fare was increased to 7 cents (population for two cities missing) | 83 | 21,815 |
| Cities in which the fare was increased to 6 cents | 164 | 67,653 |
| *Cities in which the reduced-rate tickets have been abolished, population for two cities missing | 52 | 53,839 |
| Cities in which a straight 5-cent fare is being charged with an additional charge for transfers | 6 | 100,442 |
| Cities having a 5-cent two-mile zone—next zone 5 cents for 1¾ miles, 5 cents for each 1¾ miles thereafter—1 cent transfer charge | 5 | 83,760 |
| Cities in which the fare was increased to 10 cents | 6 | 11,293 |
| Cities having a 5-cent central zone, 2-cent outside zone | 4 | 126,143 |
| Cities having 6-cent zones | 3 | 52,462 |
| Cities in which a 5-cent fare is being charged, with an additional charge of 5 cents for each zone outside city | | 21,561 |
| Cities having a 6-cent central zone, 2 cents outside | 1 | 64,720 |
| Cities having a 7-cent inner zone, 5-cent outer zone, and 10 cents between | 1 | 66,503 |
| Cities having a 5-cent central zone, 7-cent outside zone, overlapping central zone | 1 | 586,196 |
| Cities having a 5-cent central zone, 3 cents per mile outside | 1 | 535,485 |
| Cities in which a 5-cent fare is being charged, with an additional charge of 1 cent for rides outside of city | 1 | 38,272 |
| Cities in which a 10-cent fare is charged for owl service, day fare, 5 cents | 1 | 58,716 |
| Cities in which the price of reduced rate tickets were increased from 8 to 25 cents to 6 for 25 cents, cash fare, 5 cents | 1 | 220,135 |
| Cities in which the fare was increased by adding a 5-cent charges for rides outside of city limits | 2 | 70,528 |

*One city also included in six-cent group.
**Three cities, total population 140,808, served also by Bay Street Railway, included in fourth group.

## MISCELLANEOUS

### Work of Municipal Factory Site Commission.

Baltimore, Md.—The executive secretary of the Municipal Factory Site Commission reports that as a result of the recent campaign of advertising he had received up to March 31, 334 inquiries. Of these about three hundred were simple requests for books and upon being followed up with letters only added about ten to the list of those who really felt any commercial interest in Baltimore. At the same time it is reasonable to assume that some good was done in spreading the knowledge of the advantages of the city. About twenty-five are still in course of correspondence. Three have already opened business here. During the last few weeks, says the report, "we have had visits from three large concerns, who are seriously thinking of coming here and much time was spent in making necessary investigations. Altogether one or the other of these three visitors has been here for eleven whole days, and still more visits will be necessary. The selection of a factory site or suitable property is a comparatively small part of the work. Full and accurate information must be obtained with reference to freight, differentials, power, water, commerce, exports and imports, taxes, general laws and many other points which vary according to the nature of the industry or business. In all of this I have received valuable assistance from the B. & O. Industrial Agent, the Chamber of Commerce, the Real Estate Board, and the private real estate agents as well as from many members of the Factory Site Commission."

### Wisconsin Cities Must Provide Comfort Stations.

Madison, Wis.—The governor has signed a bill passed by the state legislature requiring that every city and incorporated place in the state must "provide and maintain a sufficient number of suitable and adequate public comfort stations for both sexes." It is provided that the state board of health shall establish rules and regulations governing the location, construction, equipment and maintenance of such stations and may also prescribe minimum standards that shall be uniform throughout the state.

## LEGAL NOTES

### A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

### City's Right to Change Policy.

(N. Y. Sup.) When a municipality, or one of its bodies or departments, has lawfully adopted a policy, or has resolved to proceed in a certain way, and that policy or action has been carried out, it cannot be rescinded or changed, though a different policy or action might have been equally valid.—Schieffelin v. Hylan, 174 N. Y. S. 506.

### Firemen's Pension Laws—Construction in Favor of Benefited.

(Ill.) The purpose of laws for firemen's pensions is beneficial, and statutes of that character should be liberally construed in favor of those to be benefited.—Colton v. Board of Trustees of Firemen's Pension Fund of Bloomingdale, 122 N. E. 73.

Under Laws 1907, p. 190, § 8, providing for the pensioning of firemen and their dependents, and in view of sections 7 and 10, held, that the widow and guardian of the minor children of a fireman is entitled to a pension upon his death from injury received while in service in the fire department, though deceased had not served 22 years.—Id.

Under Laws 1915, p. 296, § 8, widows, orphans, and dependent parents of deceased fireman, who are entitled to a pension under Laws 1907, p. 186, are entitled to the pensions provided for by act of 1915.—Id.

### City's Power to Maintain Summer Camp—Liability for Injury.

(Cal.) City of Los Angeles, under its charter, art. 1, § 2, subd. 4, held not authorized to maintain children's summer camp in any proprietary or private capacity, as any substantial doubt concerning existence of power in such respect must be resolved against city.—Kellar v. City of Los Angeles, 178 P. 505.

City, in conducting summer camp, under charter provisions for maintaining health of children of city, held engaged in governmental function, though making small charge to help pay costs, so that it was not liable for negligence injuring boy at camp.—Id.

Children's playgrounds, maintained by city for general use, do not differ substantially from public park, in so far as question whether their conduct is governmental or proprietary activity of city is concerned, and maintenance of park for sole benefit of public, not for any profit to city, is a governmental function.—Id.

# NEWS OF THE SOCIETIES

**Aug. 26-28.**—LEAGUE OF CITIES OF THE THIRD CLASS IN PENNSYLVANIA. Twentieth annual convention, Allentown, Pa. Secretary, Fred H. Gates, city clerk, Wilkes-Barre, Pa.

**Aug. 27-29.**—VIRGINIA STATE FIREMEN'S ASSOCIATION. Thirty-third annual meeting, Charlottesville, Va. Secretary, E. K. Landis.

**Oct. 27-30.**—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, New Orleans, La. Secretary, A. W. Hedrich, 169 Massachusetts ave., Boston, Mass.

**Nov. 12-14.**—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Springfield, Ill.

### National Conference on City Planning.

A large attendance was attracted to the recent eleventh annual meeting of the National Conference on City Planning. The range of subjects of papers and discussions was very wide, but all emphasized the fundamental importance of sound planning as a basis for municipal engineering. The topics included planning of industrial towns, zoning, regional planning, the relation of railroad location to industrial and regional planning, civic centers and war memorials.

Frederick Law Olmsted, in his last presidential address, after serving for ten years as president, pointed out some lessons drawn from his war experiences in planning cantonments and housing projects in connection with war industries. The difficulties encountered in securing co-operation in a complex undertaking, Mr. Olmsted said, are not so much due to the work in hand as to the mental and moral inertia that keeps different persons from getting together. The two chief dangers are excessive departmentalization, under which each does his part sequentially and independently instead of in co-operation, and some one man assuming that he knows it all and trying to make all his associates his subordinates.

Mr. Olmsted declared that, so far as he remembered in his work with the United States Housing Corporation, Philadelphia was the only city which had definite plans for thoroughfares beyond the district limits. He urged that every city engineering office should have at least one man devoting his entire time to planning for future development.

In referring to Mr. Olmsted's statements, Arthur C. Comey, city planner, Cambridge, Mass., said that "however we may feel about it, municipal engineers are going to do a large part of town planning. He said that planning would be increased because of the recent examples set by the Government, and there are not enough professional city planners to do it all. The city planning conference should bring in the municipal engineers, he declared.

The city planning problems of industrial cities were outlined by John Nolen, and they were specifically illustrated by wall plans from reports by Mr. Nolen on Niagara Falls, N. Y., Akron, Ohio, and Flint, Mich. Akron, according to Mr. Nolen, has only one street extending clear through it unbroken, and that one is narrow.

Warren H. Manning, city planner, Boston, outlined a study he had made of the industrial-planning needs of Birmingham, Ala. The city has no up-and-down thoroughfares, only crossways. The adjacent villages, industrially related, should be connected with the city. Zoning is needed, and since the life of a building is 30 years, after which it becomes second-class, zoning for Birmingham is planned on the assumption that after 30 years the residence section on the lower level will become a manufacturing district, the houses going back to the higher levels.

The rehousing operations of the Relief Commission of Halifax, N. S., were outlined by George A. Ross, of McDonald & Ross, Montreal, architects to the commission. Of 750 permanent new homes are planned, some 200 nearing completion.

"Definite boundaries have been fixed by survey lines, street grades have been established on all main thoroughfares and building lines laid down for all properties throughout the area. Definite sections have been set aside for residential and industrial development, and areas fixed for first and second class construction.

"The Halifax rehousing problem differed radically from that presented by the usual industrial town or housing development, in that well developed streets had existed in this area before the explosion and the water and drainage service in the streets was still intact, and must, if possible, be taken advantage of. The original city plan of this section, having little or no regard for the ground contours, was naturally not very satisfactory, with streets arranged on a hillside in rectangular blocks, so that the cross streets mounted straight up a hill at excessive grade with main thoroughfares only at the top and bottom of the slope, having no convenient means of communications between them.

"In the study of the new town planning scheme, it was decided to retain as many of the old streets as possible, preserving the existing water and service lines, and to introduce two new diagonal thoroughfares crossing midway up the slope, so as to give communication at easy grades between the upper and lower levels.

"Careful consideration was given to the study of the main traffic thoroughfares with the result that the diagonal boulevards were fixed at a width of 80 feet, and while wide streets have been established in certain instances for traffic reasons, and as an incentive to a more desirable housing development, still many existing streets on the other hand bearing no direct traffic have been reduced, all street widths being fixed with regard to their grades, length and estimated traffic.

"A general plan with regard to building lines has been adopted, fixing a distance of not less than 15 feet from the street line where lots are 100 feet deep or over. For shallow lots the setback has been reduced three feet for every 10 feet of reduction in the depth of the lot, subject to proper architectural treatment being given to the building.

"To give quick shelter, frame houses on a court-group plan were built. These will afford low-rent houses after their temporary occupants have moved. With a few variations in ground plan, 24 types of exteriors were secured for these group houses. A total of 110 individual houses has been built, and contract plans for 150 more are under way."

The relation of steam railways to the city plan was outlined by E. J. Fort, city manager of Niagara Falls, N. Y., and was also considered with special reference to that city by him and by Walter McCulloh, consulting engineer, Niagara Falls, and J. L. Harper, chief engineer of the Niagara Falls Power Co.

Mr. Fort said that, "within its comparatively narrow limits of less than nine square miles, the city is crossed from north to south by three surface railroad lines and from east to west by two such lines. It also has within its corporate limits four separate and distinct extensive railroad yards. Obviously, the ideal in the way of a city plan cannot be attained unless some changes are made in those conditions.

"There are several alternatives. Lines may be relocated so as to entirely eliminate some of the most objectionable ones. They may be elevated or depressed so as to allow streets to cross at grade, or they may all be allowed to remain as they are, depressing or elevating street crossings where, from time to time, it becomes necessary to do so.

"The problem would be much simplified, were it practicable to introduce terminal yards and stations, but such arrangements greatly increase the amount of switching necessary and the general expense of operation. They are generally resorted to only when through connections are not obtainable either at the termini of roads or where the size of the city or other conditions compel their adoption.

"Regardless of what the final plan may be, great relief to every one concerned and considerable advantages to the railroads themselves would come from the electrification of all lines within the limits of the cities located along the Niagara frontier. The abun-

*(Continued on page 61)*

## INDUSTRIAL NEWS

**Life Saving Stations"** is the title of an attractive two-color folder issued by Wallace Tiernan Co., Inc., comparing waterworks sterilizing plants with life saving stations. The folder is illustrated by photographs showing the Kisco River chlorinating plant of the New York City water supply.

**The Kennedy Valve Manufacturing Co.,** Elmira, N. Y., announces with deep sorrow the death of the works manager, Daniel J. Kennedy, on June 19.

**The Electric Hoist Manufacturers' Association,** through its New York City engineering committee, has prepared a booklet on "Facts for Operators of Electric Hoists." Copies may be had on application to the secretary, W. C. Briggs, 30 Church st., New York.

At a meeting of the board of directors of the **Wheeler Condenser & Engineering Co.,** on July 8, J. J. Brown, formerly vice-president and general manager, was elected president, succeeding Charles W. Wheeler recently deceased. H. S. Brown, Boston, was elected vice-president. No other changes were made in the officers. Mr. H. S. Brown has been associated with the Power Specialty Co. for the past fifteen years, the greater part of the time as New England manager. He is also president of the Brown-Ferries Co. of Philadelphia.

The business of the Wheeler Condenser & Engineering Co. has more than quadrupled during the past ten years under the management of J. J. Brown, and the manufacturing capacity of the plant has been correspondingly increased. One important addition has been the construction of a large tube mill for the manufacture of seamless drawn tubing of brass, copper and special mixture. In this mill the record output of nearly one million pounds of condenser tubing in one month was recently made. This tubing is used not only in Wheeler condensers, evaporators, reboilers, etc., but it is also made in large quantities to customer's specifications for American trade and for exporting.

## NEWS OF THE SOCIETIES

*(Continued from page 60)*

dance of cheap electrical power and the rapid increase in business and population which is taking place should make such a change practicable in the near future.

"Such changes as have already been made have consisted in elevating street crossings entirely above the tracks or depressing them below them in such a way as not to disturb them either as to line or grade. These changes add nothing to the embellishment of the city. They are not convenient for street traffic and they are expensive. While the more recent improvements of this character have no doubt been wisely planned, as it seems probable that the railroad lines affected will not be materially changed, and indefinite continuation of this method of grade crossing elimination would result in much haphazard building and waste of public funds."

Mr. McCulloh reviewed four plans of railway relief prepared for Niagara Falls, those of the New York Central, the Grade Crossing Commission, John Nolen and E. P. Goodrich. Mr. Harper urged that in view of the great power developments of the future, resulting in a city extending to include Lockport, railway planning should cover more than the present small corner occupied by Niagara Falls. The railroad problem was also discussed by J. E. Noulan Cauchon, engineer, Ottawa, Ont.

A whole session was devoted to the subject of regional planning, with papers by Thomas Adams and Morris Knowles. Mr. Adams' paper included a detailed study of the Niagara Falls district on both sides of the international boundary, accompanied by maps and diagrams showing populations, resources and public utilities. He said, "As an immediate practical measure I suggest that a permanent conference or joint town planning commission of representatives of all the municipalities in the region be created to prepare a regional survey and a general plan for the area; that Federal, State and Provincial aid be invited towards the preparation and carrying out of a comprehensive scheme."

Sewage disposal problems of the region were discussed by T. W. Barraly, city engineer of Tonawanda, N. Y., who seemed to favor disposal through a combined sewage and power canal leading from Buffalo to Lake Ontario.

In general discussion, R. A. Pope, of New York City, said that regional planning is dependent on economic governing conditions and is therefore essentially within the province of the engineer. E. P. Goodrich, consulting engineer, New York City, said he was engaged in two regional studies that take into account the resources and export possibilities of the district.

The subject of water fronts, came up at another session, when the Palisades Interstate Parkway of New York and New Jersey was described by W. A. Welch, chief engineer, and a proposed extension of the New York State Reservation at Niagara Falls so it would reach nearly the whole length of the United States side of the river—as does already the Dominion Reservation on the Canadian side—was outlined by Ansley Wilcox, of Buffalo. In this connection may be mentioned also a description of the proposed "peace bridge" across the Niagara River at Buffalo. A small appropriation for the study of this project was recently vetoed by Governor Smith of New York.

The question of zoning was apparently of greatest interest to those present. A supper session was devoted to brief reports on progress and an afternoon to residential zoning. Among the cities that have enacted zoning regulations are New York, St. Louis, Los Angeles, Oakland, Alameda, Berkeley and Palo Alto. Zoning for some cities has been authorized by the legislatures of New York, Pennsylvania and Nebraska, and by constitutional amendment in Massachusetts. Zoning regulations are being framed or are seriously proposed in Cambridge, Mass.; Buffalo, Cleveland, Detroit, Spokane, Portland, Ore.; San Francisco and other cities.

Arthur C. Comey, of Cambridge, Mass., who opened the discussion on residential zoning, said that zoning as a whole is the largest single element in city planning. He thought that zoning regulations should be simple and drawn to last for 25 years. Zoning will stop four-fifths of the billboard nuisances in residential districts.

Charles H. Cheney, of San Francisco, declared that regulations should be changed frequently to meet changing conditions. He urged that residence, business and industrial zones are necessary to insure reasonable rentals to wage earners. Unless land owners know that a given area will be restricted to residences they will insist on wide streets and heavy pavements suitable to business districts, thus increasing the price of lots beyond what low-priced dwellings can stand. The fundamental data for zoning are costly but necessary. They can be obtained in large part from the telephone companies, which are compelled to plan 20 years ahead. In establishing zones, neighborhood opinion should be secured, Mr. Cheney urged. This serves not only as a guide, but when brought out unmistakably is an argument that convinces the city councils that finally enact zoning ordinances. In Berkeley the Chamber of Commerce fixed the limits of the business district and the Manufacturers' Association set the bounds of the industrial zone. Harland Bartholomew, engineer of the St. Louis Planning Commission, said that zoning is a matter of four-fifths fact and one fifth judgment. The facts should be put on paper, after which the plan can be worked out.

"Common Sense of the Civic Center" was the title of a paper by Nelson P. Lewis, of New York City. He said: "In a study of the civic center problem the following fundamental principles should control: (1) The centralization of all city business in one locality, while it may result in economy and convenience in the case of a small city, may prove costly and inconvenient in a large city; (2) civic centers should be planned so that only related public business and activities need be concentrated in them, subordinate or secondary centers being established when overcentralization becomes apparent; (3) secondary centers should be so located as to be easily accessible through direct traffic routes from the principal center and from one to another, and readily found by those desiring to reach them; (4) the possible need of principal and secondary centers should be kept in mind when developing the plan of any city and its successive additions, so that a rearrangement of the streets about or leading from them may not be necessary; (5) it should be assumed that the buildings comprising the civic group or groups will be worth seeing, and the chief buildings should, therefore, be on the axis of one or more of the streets leading to them; (6) some competent and continuing authority should be required to approve plans for all civic centers and designs for all public buildings or other structures located in or about them, and such plans, once approved, should not be changed without the concurrence and approval of the same authority."

The group plan at Cleveland, on which more than $15,000,000 of obligations for land and buildings have been incurred, was described by Robert Hoffman, city engineer.

"Soldiers' Monuments in Relation to the City Plan," was the subject of a speech by H. E. Jackson, of the Bureau of Education, Washington, D. C. He urged that these express the spirit that animated the soldiers; also that it would be well to defer for some years, as have the French, attempts at works of art, since it is too early as yet to work out properly the ideals suitable for permanent war memorials of a purely artistic character.

Before adjournment the conference adopted resolutions urging the Bureau of the Census to adopt, for cities of 10,000 or more, the same districts or multiples of the same as were used in 1910; requesting the Secretary of Labor to urge mayors of all cities to appoint city-planning commissions; and asking the board of governors of the city planning conference to appoint a committee to study regional planning.

Hereafter the conferences will be continued more nearly along the lines followed for the first eight years than was contemplated two years ago when the American City Planning Institute was tentatively formed. Conference members of a year's standing may become members of the institute, which will be devoted to research work, provided they have been for at least two years in charge of some city-planning work of a major character. This work is so defined as to include both landscape and building architects, engineers and lawyers engaged in city planning. Nelson P. Lewis, chief engineer of the Board of Estimate and Apportionment, New York City, was elected as president of the conference for 1919-20, and Flavel Shurtleff was re-elected as secretary of the conference.

### National Housing Association.

The National Housing Association recently published the proceedings of its seventh anual conference held in Boston last November. The proceedings make an interesting and important contribution to the literature of the field and the volume should prove of timely value to those concerned with the questions of housing shortage, rent profiterring, the health aspects of housing, labor problems and allied subjects.

The conference brought together a large number of men and women of wide experience and practical activities, many of them leaders in their specialties. The papers covered very completely and informatively the many phases of the subject.

Among the subjects taken up are: Housing and reconstruction; the housing work of the Federal Government; the desirability of government housing, Federal, state and municipal; housing standards; rent profiteering; housing and labor turnover; labor's attitude on housing; group vs. detached houses; housing management; slums—prevention and elimination; the health department and the housing problem; home ownership. There are also papers dealing with housing conditions in Boston.

Among those who contributed to this volume are Thomas Adams, Frederick L. Ackerman, John Nolen, James Ford, Ralph Adams Cram, Albion Fellows Bacon, Charles B. Ball, Lawson Purdy and John Ihlder.

The proceedings make a very handsome volume of 450 pages. The book should be on the shelves of all interested in the problem, and may be purchased from the secretary of the association at 105 East 22d street, New York City.

## PERSONALS

Mullican, N. S., who has been chief highway engineer of Davidson county, N. C., for the past two years, has been appointed consulting engineer by Davies County. His new duties will not interfere with those of his present position.

Miller, Rudolph P., formerly superintendent of buildings for Manhattan, and chairman of the Board of Standards and Appeals, and Geo. E. Strehan, formerly assistant engineer in the Bureau of Buildings and the Board of Standards and Appeals, have become associated in the general practice of engineering at 112 West 42d street, New York City. They are prepared to design building construction, masonry, structural steel, reinforced concrete and foundations; to conduct soil examinations and tests of materials; to make inspections and surveys; to arbitrate disputes; and to prosecute petitions and appeals before the Board of Standards and Appeals. By reason of their experience in the preparation of the New York Building Code and the development of the Building Zone Resolution, they are also prepared to undertake the formulation or revision of building laws and work involving city planning.

Wooley, W. Thomas, formerly city engineer of Auburn, Hoosick Falls, Schenectady, Syracuse, and again of Schenectady, a graduate of R. P. I., class 1900, has recently been appointed engineer in charge of construction of the new state prisons at Sing Sing and Wingdale. The appointment was made by State Superintendent of Prisons Rattigan. Mr. Wooley will receive $6,000 a year and will succeed Major James C. McGuire, of New York.

Willits, George H., who has been for two years city engineer of Galveston, Tex., has resigned to become assistant to J. F. Witt, county engineer, Dallas, Tex., and will aid in carrying on the $6,500,000 county roadbuilding program.

Eidmann, O. J., assistant bridge engineer, State Highway Commission of Kansas, has resigned.

McFadden, A. S., assistant engineer State Highway Commission of Kansas, has resigned.

Wheat, Winston E., formerly junior engineer, U. S. Engineer Office, Fort Barrancas, Fla., has been appointed county engineer, Escambia County, Fla., with headquarters at Pensacola.

Jones, C. C., formerly county engineer, Watunsee and Osage counties, Kansas, has been appointed division engineer for the State Highway Commission of Kansas.

Hazelhurst, Major James Nesbit, Engineers, U. S. A., who died recently in Brussels, Belgium, was born in 1864 and received his education at the University of the South, Sewanee, Tenn. After being connected with railway and industrial work, in 1895 he became engineer in charge of design and construction of water-works and paving for the city of St. Augustine, Fla., and later chief engineer, Board of Public Works, Tampa, Fla. In 1901 he was elected chief engineer of the Board of Public Works, city of Mobile, Ala., for a period of five years, after which he resigned to enter private practice in Atlanta, Ga. When this country entered the war he was commissioned as major of engineers and assigned to the staff of Maj. Gen. Leonard Wood, commander of the Department of the Southeast, as officer in charge of water supply. In September, 1917, he was ordered overseas as principal assistant to the officer in charge of water-supply section at Chaumont, France, and was later transferred to Tours in the water-supply section. In October, 1918, he was ordered to the southeastern part of France as engineer officer in charge of construction and as water-supply officer, Base No. 6, including territory between the Riviera and the Italian frontier. Three months later he was ordered to Paris as a member of the American Commission to Negotiate Peace, asigned to the department of finance and economics of the War Damage Section, in the capacity of director of the division investigating damages to structures in Belgium.

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## DO NOT NEGLECT MINOR ROADS.

Reports coming to this office show that thousands of miles of roads are being paved this year with concrete, brick, bituminous concrete, bituminous macadam and the like; but, considering that there are perhaps ten miles of minor roads leading to the farming district to one of main highway, the amount of work being done on these, judging by the information received, seems to be far below the proper proportion. It is possible that this work is being done by the towns by their own forces and not by contract, and therefore does not receive the publicity given to the more expensive roads built by contract. We hope such is the case.

The main highways connecting the larger cities are more important, per mile, than the roads carrying only farm produce. But the latter as a class are even more important, for they are the only connection between the country districts, where the nation's food is produced, and the cities; while the cities are served by railroads as well. The traffic per mile on the minor roads does not warrant expensive paving; but they can be kept in passable condition, free from mud and ruts that limit the capacity of the wagons and from the dust that injures the produce in the loads and the standing crops, by faithful and intelligent use of the scraper, drag, road oil and other inexpensive treatment. And it is of the greatest importance that this be done.

## PENNSYLVANIA LEADS IN HIGHWAY WORK.

The Pennsylvania State Highway Department is apparently breaking the world's record for amount of work done in one season. Contracts have already been let this season for 601 miles, and 74.7 miles addition are being advertised in letting. Of the 601 miles, 513 are primary highways in townships and 22.6 are primary highways in boroughs; 28.2 miles are in the secondary highway system, 13.8 being state highways, 2.7 borough roads and 11.7 township roads.

Of the contracts let, 376 miles are reinforced concrete, the average price being $35,661; 63.4 miles are bituminous concrete, the average price being $43,396; 5.7 miles are brick, at $56,171 a mile; 1.24 miles are plain concrete at $30,833 a mile; and 24.1 miles are bituminous resurfacing, at an average of $9,507 a mile.

## GRAVELLED SIDE-DRIVES.

In the north-western section of New York state the highway department is beginning the installation of side-drives for horses, those now being built being 8 feet wide, with gravel surface. It is stated that all future roads in this section, extending from Lake Ontario eastward to and into the Adirondack mountains, will be constructed with these side-drives.

## STATE PURCHASING AGENTS.

Invitations to a meeting at Madison, Wis., on August 27th and 28th, for the purpose of discussing the advantages of having state purchasing agents, have been sent by the secretary of state of Wisconsin to the secretaries of the other states. It is desired that other states may be informed of what has been done by Wisconsin, which is the pioneer state in this movement, which, during the last four years, has saved for that state, it claimed, over a million and a half dollars, in spite of the prevailing high prices.

When Governor Philipp was elected in 1914, his first appointment was that of a superintendent of public property, who was given power as state purchasing agent. Through his activities as state purchasing agent, Mr. Blumenfeld saved $220,420 in printing and paper used by the various departments, including the university and all state institutions and normal schools; $101,200 in the purchase of automobile plates; $97,000 by installing a mimeograph and multigraph department to be used by all the state departments; $7,695 by buying goods f.o.b. capitol instead of f.o.b. Madison, thus eliminating cartage; and numerous other savings, large and small.

# CONVICTS ON ROAD WORK

### Experience with the Use of Convicts or "Inmates" in the States of Arizona, Florida, Idaho, Illinois, Louisiana, Maryland, Nebraska, New Jersey, Oklahoma, Rhode Island, Utah, West Virginia, and Wyoming.

The Bureau of Public Roads has recently made public a series of descriptions by highway commissioners, engineers and others dealing with the use of convicts in road work in many of the states of the Union, from which we condense and abstract the following more interesting features.

*West Virginia.*—Convict work in West Virginia was discussed by A. D. Williams, who first dealt with the general subject of treatment of convicts. He stated that statistics gathered by him had shown that, of the inmates of the various institutions of this country, from 8 to 33 per cent had served one or more previous sentences. The same institutions stated that, of the men who had been working in the open air on the honor system, only from 2 to 8 per cent returned for second sentences. This illustrates the moral benefit of road work on the men.

"The prisoner being a public charge and a debtor to the public for transgressing society's laws, should be so employed as to render the most beneficial service to society. The public road being the common property of the county or state, and the nation as well, offers a class of service in its construction and maintenance that is beyond a doubt the most beneficial."

West Virginia began employing state prisoners on road work in 1914. In 1917 very careful account of the cost of this work was kept classified under a large number of items such as steam shovel excavation, pipe culverts, building forms, repairing equipment, etc. The time was kept under the various items for the superintendent, foreman, steam shovel engineer, roller engineer, and each county team, hired team, prison laborer and guard, and the over-time of prison laborers. The result showed a total of 36,243 hours of prison work and 27,846 lost or uneffective hours; the latter including 4,808 hours of bad weather, 7,991 hours of holidays and Sundays, 1,134 sick hours, and 13,913 hours of camp duty.

The total cost of the camp and all expenses connected with it was $19,441.34; of which $5,039.39 was distributed as camp bills, which included equipment, supplies, etc. for the camp, plus the guard salary of $1,092.60. The labor cost $6,685.84. The road bills included $166 for reinforcement, $40 for rental on equipment, $681.42 for sand and gravel, $44.19 for pipe, $659.80 for cement, $397.93 for lumber, $2,126.85 for teams, $747.10 for equipment and other items, bringing the total up to $6,624.51. For this the state secured the removal of 28,833 cubic yards of excavation at an average cost of 40.9 cents; 128 cubic yards of foundation excavation for bridges at $1.48 a cubic yard, 263.57 cubic yards of concrete at $10.12; and numerous other items, such as laying drain pipe, French drain, placing guard rails, etc., for each of which the cost has been ascertained.

These figures were compared with those for a piece of work done by contract on the opposite side of the river, and it was found that at those prices the cost would have been $26,847.68, showing a net saving to the county of $7,642.34.

The legislature of West Virginia has for some years treated the penitentiary as a self-sustaining institution and made no appropriation for its maintenace, so the State Road Department in conjunction with the Board of Control and the county courts have worked out plans to suit as nearly as possible each separate condition. In 1914 the state undertook to guard, feed and clothe the convicts and supply labor to the county at 75 cents a day and lost money. Another camp where labor was furnished at 82½ cents likewise proved non-remunerative.

In 1918 a new contract was made with the state for one camp whereby the county bears all of the expenses and pays the state 75 cents a day, of which amount 25 cents is returned to the prisoner, who in addition receives 15 cents per hour for all time over nine hours a day. Contracts made with the state for other camps provided for a payment in one case of $1.00 per day and in another case of $2.00 per day, the prisoner, however, receiving the same—25 cents per day and overtime. At the time of writing there were 170 men working in public road camps and 50 men on special railroad work for the B. & O. railroad, these being over 25 per cent of the prison population.

*Arizona.*—Arizona has used convicts on state road work since 1909. At times the work has proven expensive and inefficient, the discipline of the convict has been poor and the idleness in the camps considerable. It has been noticed that when the work was going badly the percentage of escapes was often high. The general conclusion has been reached that convict labor is capable of producing work of good quality at low cost and with few escapes; but that such labor is more dependent on the quality of leadership than is free labor, and a convict camp under poor management may easily become a source of great annoyance, of danger to the public and of financial loss. State engineer B. M. Atwood, who furnishes this information, has no hesitancy in saying that convict labor can be made to produce the best quality of work, and can be managed so as to be reasonably contented, in clean and healthful camps, and assist the men in improving their moral and mental condition; and that when convict labor fails to achieve such results, the methods and personality of the management should be held accountable. He believes, however, that there are relatively few men who are gifted with the quality of leadership required in handling this class of labor. He has found that such labor cannot be used to handle high-class machinery to advantage and that it is advisable to employ paid labor on such machinery. The cost of work done by convict labor in Arizona has been approximately two-thirds of that done by free labor.

In Arizona camps, the prisoners are required to use their spare time in some healthful form of recreation such as baseball. Chess and other games, magazines, etc., are provided for rainy days and evenings. It is believed that rewards for satisfactory performance of work should be offered, by reducing the length of sentence, by paying some form of scrip that is exchangeable for fruit, candy and other things at the commissary, or in the form of funds held in trust for the convict.

*Oklahoma.*—The first convict camp in Oklahoma was established in the spring of 1916, since which time there have been in all fourteen camps. The convicts have been used to build especially difficult stretches of road which proved to be too costly for the counties themselves to handle, thus completing through-state roads in which there would otherwise be links that could not be constructed as soon as the rest of the system.

The state furnishes all teams and tools and allows the county an amount of money for the rations of the men kept at the penitentiary. The county provides any additional cost of rations, as well as feed for the teams, fuel and explosives. The excess cost of rations has varied from one cent per day to 26 cents. The camps have varied in size from fifteen to one hundred men. Where the men have not been trusties, additional guards are required at the expense of the county. In general, the convicts are used on mountainous sections of roads where the cost of labor is the big item in the construction cost.

*Florida.*—According to William F. Cocke, state road commissioner, prison labor has been used in Florida for road work to some extent almost from the time the state was organized. For many years state prisoners and a large percentage of the county prisoners were leased out to individuals or corporations for work in saw mills and turpentine camps. Not until about 1910 did the counties generally begin making use of their prisoners for road work, and no state prisoners were used on roads until 1915.

A late prison census showed that there were about one thousand able-bodied male state prisoners and twelve hundred county prisoners. Nearly all of the latter were being employed on road construction and maintenance and about 450 of the state prisoners; the balance of the able-bodied state prisoners being leased out. In 1917 the state legislature provided that the State Road Department might use not to exceed 300 low-grade state convicts, but so far the greatest number employed has been 160. The prisoners are housed in cages mounted on wheels, which the writer considers bad for the physical and moral welfare of the prisoners.

Since establishing the state convict road forces in 1917, the cost of feeding, clothing and guarding them has increased so rapidly that it is difficult to determine the fair average price per man; but as the price of labor has about kept pace with the cost of living, it is safe to assume that the total cost per man has not exceeded 50 per cent of the current wage for the same class of labor.

Prisoners have been employed chiefly on grading and sand-clay construction and to a less extent on the higher types of surfaces. A comparatively small percentage of the men furnished by the state can be used as trusties but, although only the lower grade of prisoners have been provided and other conditions have been unfavorable, the success of using state convicts is assured and it is expected that the lease system will be entirely abolished and all able-bodied state prisoners placed on road work.

*Maryland.*—The legislature of Maryland has authorized the State Road Commission to call upon the State Board of Control for as many of the convicts as it can use for building and maintaining state roads, and there are now employed in this way about 200 from the house of correction and 100 from the penitentiary. The prisoners remain under the personal supervision of the State Board of Prison Control. A very large part of the daily pay is paid over for the benefit of the convict himself.

*Illinois.*—The Illinois legislature in 1913 authorized the employment of convicts in preparing road-building materials and working on public roads. They had been used in preparing road-building material since1906, the output of crushed stone from the penitentiary at Joliet and Menard varying from 40,000 to 154,000 cubic yards a year. All crushed stone has been furnished free f. o. b. cars at the penitentiary to county and township road officials applying for it and agreeing to pay the freight.

Since 1913 seven convict camps have been established for constructing earth, gravel and macadam roads, and Clifford Older, chief highway engineer, says that these have been a success from both the economic and humanitarian standpoint. All these camps have been honor camps and only selected men chosen. Each convict receives one day off his sentence for each three days employed in a road camp. The state receives 50 cents per day for each convict and uses this in feeding and housing the men. No guards are employed except one night watchman and one custodian and there have been no escapes. Experience has shown that better results are possible when the men are given an opportunity to earn a little extra money, although satisfactory results have been secured without this incentive in preparing road materials in the penitentiaries. Last year Illinois paroled a very large number of convicts for work in munition factories, and the men made good.

*Louisiana.*—The State Highway Department of Louisiana used convicts for road construction from the time of its creation in 1911 until 1914, since which year all the convicts available were needed for working the plantations and other industries. However, in July, 1918, the the Highway Department secured from the penitentiary 100 convicts at a cost of $2.50 a day, the Board of Control of the penitentiary providing for the feeding and upkeep of the men. It was necessary, however, to return the men by October 1st as they were needed for harvesting crops raised on the penitentiary farms.

Up to April 20, 1914, according to the statement made by Duncan Buie, state highway engineer, about 155 miles of road had been constructed by convict labor at a total cost of $152,915. Three miles of these were sand-clay roads, five miles were sand-clay gravel, and the balance were ordinary earth. This cost also covered constructing 1.1 miles of drainage canal at a cost of about $3,000.

The earth roads cost about $884.90 a mile and the gravel roads $3,196.58. Mr. Buie does not venture to estimate what it would cost to construct a metal-surface road with convict labor at the present time, but where the department last used convicts for building a shell road, their labor had cost $2.60 per cubic yard, while similar work with free labor had cost about $4 per cubic yard. One of the principal factors in the reduction of cost was that the convict labor was on hand at all times, while work was being continually tied up under free labor because the men could not be counted upon to work continuously.

*Rhode Island.*—Rhode Island first used convicts on public roads in 1917. The law passed that year provides that the guidance and maintenance of the convicts shall be taken care of by the state penal and charitable commission, while the direction of the work is in the hands of the state highway department.

Two convict camps of thirty men each were established in 1917 for constructing bituminous macadam pavements. The highway department at first paid $1.50 a day for the services of convicts, but when the work was about half finished the commission insisted upon an allowance of $2.25 per day with no deduction for stormy weather. Both of these pieces of work had been advertised for bids. The actual cost of the work done by the convicts in Camp No. 1 was $26,055, while the low bid for this work in the spring was $23,687. The work done by convicts from Camp No. 2 cost $21,105, while the low bid had been $25,463. In addition to the work of Camp No. 2 costing less than the bid price, it was also more satisfactory in quality.

I. W. Patterson, chief engineer of the Board of Public Roads, states that it was concluded that the reason for the variation in the results in the two camps was largely difference in housing facilities, in food and in the personalities of the guards. At Camp No. 1 the men were housed in a large tent, which was not wholly water-proof during long continued rains, and late in the season it was impossible to heat it sufficiently for comfort. Camp No. 2 was a wooden building which furnished a very satisfactory shelter. Also the food furnished at Camp No. 1 was frequently of rather poor quality. The effect upon the efficiency of the gang for several days after an unsuitable meal was very noticeable. Attempted escapes from Camp No. 1 were rather frequent but they were unknown at Camp No. 2.

The commission'sfigures show that the average cost of maintaining convicts at the camps was $6.65 per man per week, while the cost at the prison was $4.20 a week.

Mr. Patterson believes that the best results are secured by using convicts of middle age, since those under thirty years are less apt to be reconciled to their fate and more apt to attempt to escape, and take less interest in their work. A small money incentive, a reduction of sentence and better food are recommended as incentives for faithful work, especially when of such nature that careful workmanship is necessary in order to secure good results.

A number of convicts employed upon road work in 1917 and whose terms have expired since then have been employed by contractors or by the State Highway Department upon road work. No figures are available, but it is known that a considerable number have done this. During 1918 no convicts were used because of the demand for all of the able-bodied ones in farm work at the prison.

*New Jersey.*—Convict labor was first used on the highways of New Jersey in autumn of 1912 and has been continued to a greater or less extent since then. "The present laws governing the use of inmate labor on highways leave much to be desired," says W. G. Thompson, state highway engineer, but more favorable legislation is hoped for at an early date. A few inmates were used during 1913 and 1914 and, notwithstanding unfavorable conditions, $41,360 worth of convict road construction work was done in 1915 at a cost of $38,840, the value of the work being based on the then current prices. The work performed included earth and rock excavation, construction of macadam, operating stone crusher and quarry, constructing reinforced concrete culverts, etc.

ARIZONA ROAD BUILT BY PRISON LABOR.

CONVICTS LAYING BRICK ROAD IN FLORIDA.

During this experimental period the highway department fed and housed the men, paid the guards, and paid the prison authorities 50 cents per day per man. Later the prison authorities took over the feeding of the men and furnished the guards and the highway department paid $1.25 per man per day. In 1916 the price was increased to $1.45 per day and in 1917 to $1.55. During 1918 the prison received $2.00 per day for each satisfactory man-day's work, of which amount each man received 50 cents, which is credited to him or turned over to his family. If any man's work is unsatisfactory to the highway department, he is returned to the prison. The prison authorities make mental and physical examinations of each inmate to determine his fitness for employment on the roads and in other capacities.

In the autumn of 1917 a penetration macadam road to Camp Dix was built with the young men of the state reformatory. The State Highway Department paid $1.75 per man per day, of which each man whose work was satisfactory received 50 cents. The work performed by these men was so unusual in quantity and quality as to cause much comment, especially when compared with free labor employed in cantonment construction near by which was receiving from $3.50 to $4.50 per day.

The present program includes three camps, each capable of housing 110 men and furnished with heat, water and light. The prison department furnishes guards and feeds the men, the highway department supervises the construction and furnishes the working equipment. Each project calls for about four miles of concrete pavement, with culverts, bridges, guard rail, etc. All mechanical equipment is operated by free labor. The system will be expanded as rapidly as the number of men available will permit and existing laws are modified to give greater elasticity in the disposition of the men in the field and a closer co-operation between the reformatory institutions and the highway department. A comparison between the labor of these men at $2.00 per day and the general run of free labor at $3.50 to $4.00 per day is decidedly in favor of the inmate labor.

*Wyoming.*—Convict labor has been used in Wyoming since 1911, the number of gangs in the different years varying and the size of gang varying from ten to twenty men. Up to 1917 practically all of the work was done without survey or plans and with no record of cost. During 1917 a gang of sixteen men continued work on a road that had been in progress for two years previous, but worked according to surveys and plans of the State Highway Department, the cost being paid by Lincoln

STORM SEWER 1,400 FEET LONG TO CARRY CREEK UNDER NEW JERSEY ROAD, BUILT BY CONVICTS.

county. In 1918 a gang of eighteen convicts continued the same work and this was the only convict road work done in the state last year, convicts who ordinarily would have been available for road work being used on farms and ranches.

This project is located entirely in a canyon and involves a considerable amount of rock work, which class of work is more suitable to convict labor than that where teams and machinery are employed. On this job the work done by convicts was equal to that done by common labor. The superintendent boarded the men, receiving 40 cents per meal. No guards were provided and the men were sent alone to the nearest railroad point thirty miles away for supplies and to distant ranches for hay and feed. They were allowed to have guns and ammunition for hunting, and fishing tackle for trout fishing and a considerable proportion of the fresh meat used in the camp was obtained in this way. Each convict was allowed $5 a month for tobacco and other luxuries. During the past year only two men have attempted to escape. The above information was furnished by Z. E. Sevison, state highway engineer.

*Utah.*—Convict labor has been used on road work in Utah since shortly after the organization of the State Road Commission. Its use has been confined, however, to heavy construction in the mountain districts, since compactness of organization is necessary to prevent wholesale escapes. In the summer of 1918, after the disastrous floods had washed through Mount Pleasant City, the State Road Commission and the Board of Correction co-operated in sending a steam shovel outfit and a force of convicts to assist in clearing the street and drainage channels, labor being very scarce.

When a gang of prisoners and of ordinary laborers have been working on the same roads, state road engineer Ira R. Browning says that he has been impressed with the lack of efficiency of the convict laborers. A gang of thirty convicts showed an average of less than twenty regularly employed on the road, there being an inclination to stay in camp on account of slight illness or indisposition. It is believed, however, that the adoption of the honor system among the prisoners that will abide by the rules has placed them practically on a par with average free labor so far as effective work is concerned.

*Idaho.*—The state highway engineer of Idaho, H. C. Allen, reports that the experience of that state with convict labor in road building has not been very extensive. In 1916 a convict camp was established for a short stretch of heavy construction by the State Highway Department, but the results obtained were disappointing because of the heavy overhead expense, due largely to the remoteness of the work and the high transportation costs and the fact that not enough convicts were available to keep down the overhead expenses. In 1917 work was done on a rock canyon road by the prison board where, as in other cases, the men were on honor. This work was satisfactory. In 1918 the prison board and the commissioner of Ada county arranged for grading a small stretch of highway adjacent to the penitentiary. The labor performed compared favorably with free labor, but because of the divided responsibilities the results were not satisfactory. However, had the convicts not been available this work would not have been done at all at that time. One prisoner of a crew of fifteen escaped during a period of about eight weeks. Last fall the highway department used convicts in repairing some roads within ten miles of the penitentiary because of the great scarcity of free labor, the men being transported between the work and the penitentiary in a truck. They performed this work very satisfactorily. The men doing this work are paid a small sum for their work, which is credited to them on the prison books.

*Nebraska.*—Convict labor has been found profitable in constructing roads in Nebraska, according to George E. Johnson, state engineer. In 1915 a street was to be paved which was controlled half by the state, which owned property facing on one side of the street, and half by the county. It was agreed that one-half the length of the road should be built by the county by contract, while the state built the other half by convict labor. The road was 32 feet wide and the work included 6x20-inch concrete curb, a 5-inch concrete base and a brick surface with asphalt joints. The convicts made the wooden forms used for the curb. Thirty-seven men were employed and were on parole, there being no night guard, a day guard being there only to see that the rules were observed. During the ninety days of work the only one to break parole was a colored boy who had four months to serve. The men were willing and faithful and felt that they were just becoming efficient when the work was finished. Each man took a secret delight and personal satisfaction in the accomplishment of a day's work and on Sundays they were frequently found examining and comparing the adjoining contractor's work and their own. The work was entirely satisfactory and the pavement is perhaps the best in the state. Using the adjoining work as a basis and estimating the probable cost of the pavement by contract, the use of convicts saved the state $5,624.

Note.—See also the following articles in Municipal Journal: Road Work with Convicts in Iowa, Vol. XLIII, page 154; Convict Labor on Road Work, Vol XLII, page 474; Road Construction by Convict Labor, Vol. XXXIX, page 435; Convict Work in Arizona, Vol. XXXIX, page 430; Convict Labor on Arizona Highways, Vol. XXXVII, page 350; Road Construction by Convicts in Virginia, Vol. XXXVII, page 662; Convict Labor in New Jersey, Vol. XXXVI, page 813.

ROAD BUILT BY WYOMING CONVICTS.

## REFUSE DISPOSAL IN ENGLAND.

Birmingham, England, has gone very thoroughly into the matter of refuse disposal and utilization. This department is in charge of James Jackson, as salvage superintendent, and he has recently set up a laboratory fully equipped for analytical and research work and added to its staff a qualified chemist, a part of whose duties is to make periodical tests on the by-products obtained and conduct experiments with a view to further developments in the treatment of all kinds of refuse. Mr. Jackson believes that scientific investigations along this line will reveal far better and more profitable methods than have so far been employed. One feature of the salvage works is the increasing use of electricity for operating the various mechanisms there. In the fertilizer and grease extracting plant all of the machinery has been electrified, each driven by a separate motor, and the same is true of the wheelwright's shops.

Practically all English cities collect all of their refuse together, the general method of disposal being destruction by fire. During the war, however, the value of much of the material collected was made evident, and, as an important feature of the salvage, the desirability of keeping the salvageable materials separate from the others. In Birmingham it is the intention to install the dual refuse system as quickly as possible. Two refuse cans will be required at each house instead of one, one to receive the ashes and sweepings only, the other to receive tin cans, rags, glass, bones, scrap iron, shells, paper, bottles, etc. The refuse will be collected by vehicles, each of which will be divided into two compartments, one to receive the ashes and the other the "salvage" material. On arriving at the salvage works the ashes will be emptied onto a screen and the salvage portion of the refuse onto a long traveling belt from which the various classes of material will be picked and graded. The fine dust in the ashes, which forms about one-half of the total quantity of house refuse, will pass through the screen directly into wagons or boats for disposal to farmers as a dressing for land, or hauled to dumps. The coarser material remaining on the screen will be used for fuel at the plant or will be washed and sold as a cheap fuel.

Tin cans are de-tinned and de-soldered, plants for both of which operations are owned by the municipality, and are then compressed into bundles by hydraulic power. The detinning plant at present in use is an experimental one, but it is hoped to erect another very soon of much larger capacity, containing many improvements which will increase the economy of operation.

During the war the city found a ready sale for rags of all kinds and conditions, but with a decrease in demand it is found that they must be in a fairly clean state to bring a good price. Consequently a rag washing plant is now being installed. The rags will first be picked from the picking belt, the cotton and woolen being separated, and will then be passed through a mechanical washer, then through a steam-driven turbine hydro-extractor, and finally into a mechanical dryer. After being dried they will be baled by hydraulic presses.

Birmingham has been using three steam motor trucks and two light gasoline motors, and recently has put an electric truck into service, although at the time this information was given (June, 1919), three other electric trucks were expected within a few weeks. If the electric vehicles prove as satisfactory as is anticipated, it is expected that twenty more will be ordered.

Blackpool is said by James Bee, the cleansing superintendent, to collect fish refuse separate from other kinds and make it into fertilizer. For several years it has been collected in special covered trucks. Air-tight cans are supplied to fish dealers with the understanding that all of the fish waste is to be collected by the corporation. The practice of making it into fertilizer has continued for about thirteen years, two steam jacketed cylinders, each ten feet by five feet, being used for this purpose. For the first two or three years $20 a ton was obtained for fertilizer so manufactured, and this price has increased year by year so that, in 1914, $47.50 was obtained, and in 1918 the price of $90 was reached. Before the war the municipality sold about 100 tons a year and during the last fiscal year 92 tons were sold, bringing $7,000.

## CITY-MANAGER GOVERNMENT.

### Interesting Data Concerning the 128 City Managers —Previous Occupation, Training, Salaries Received—Achievements in Several Cities.

The fifth "Year Book" of the City Managers' Association has just left the press, and contains an unusually complete assortment of facts concerning city manager government in the United States. Part of this information was given in the form of the proceedings of the association's latest meeting, part as brief reports from the various city managers, and in addition are many facts and figures arranged in tabulated or other form.

From this we learn that there are 128 city managers at the present time, 63 of which are members of the association. Of these managers, 48 per cent are engineers and 25 per cent are business men. Seventy-seven per cent had previously been in public service, 40 per cent as engineers or connected with public utilities. Thirty-one per cent had received training in colleges or bureaus of municipal research, but 63 per cent of the association's members had been so trained. Thirty-five per cent were non-resident when appointed, but of the association members, 53 per cent. Fourteen are serving their second city as managers, and 4 are serving their third city.

As to salaries, 19 are receiving $5,000 and over, 30 receive $3,000 to $5,000, 23 receive $2,000 to $3,000, and 39 receive under $2,000. Of the association members, only 7 receive under $2,000, 10 receive from $2,000 to $3,000, 27 receive $3,000 to $5,000, and 17 receive $5,000 or over. Classified according to the size of the city, the average salary paid by those of over 50,000 population is $6,322; by those of 20,000 to 50,000, $5,116; by those between 10,000 and 20,000, $3,016; by those between 5,000 and 10,000, $2,220; and by those under 5,000, $1,963.

There have been 229 men appointed as city managers, 101 of which no longer hold such positions. Of the present 128 city managers, 44 have served two years or over, 39 have served one year, and 45 less than one year.

Forty pages of the year book are occupied with what are called "achievement reports," in which, in a few sentences, the principal achievements of city-manager government in each of the cities are set forth. Some of the more interesting of these are as follows: Lowest tax rate in the state and no overdrafts. Public safety of first importance. Citizens well satisfied. Saves $44,000 first year. Complete city plan adopted. City sells potatoes and fish. Raised wages of all city employes, but saved on salaries by combining offices. Reduced debt, cut budget, but increased service. Lowest infant mortality rate. Invites suggestions from taxpayers. Adversity proves manager plan flexible. Put water plant on sound basis. More efficiency, less taxes. Most improvements in city's history. Removes ill feeling at elections. Publicity a part of program. A bureau of complaints. Complete information on public affairs.

About half of the reports emphasize the fact that the expenditures have been decreased. This probably is the feature that would appeal most to the majority of taxpayers and also is one of the benefits most easily given definite expression. However, in the "foreword" of the year book, under the heading "Please Keep Three Thoughts in Mind," is the statement, "Government cannot be measured by the tax rate. Efficiency may allow reduced taxes; it may demand increased taxes; it may even dictate a deficit, in emergency, rather than endanger public safety. Real success lies in selling the most good government to satisfied taxpayers."

These are only a few of the "high points" in the year book. Much more complete information concerning city-manager government can be obtained by a perusal of its 175 pages.

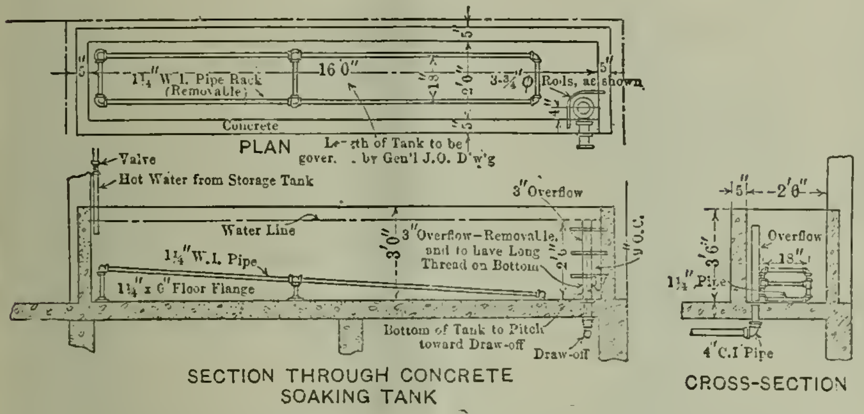
# WASHING GARBAGE CANS.

## Device Adopted for Cantonments for Soaking Cans and Washing with Hot Water—Cans Collected and Returned Clean.

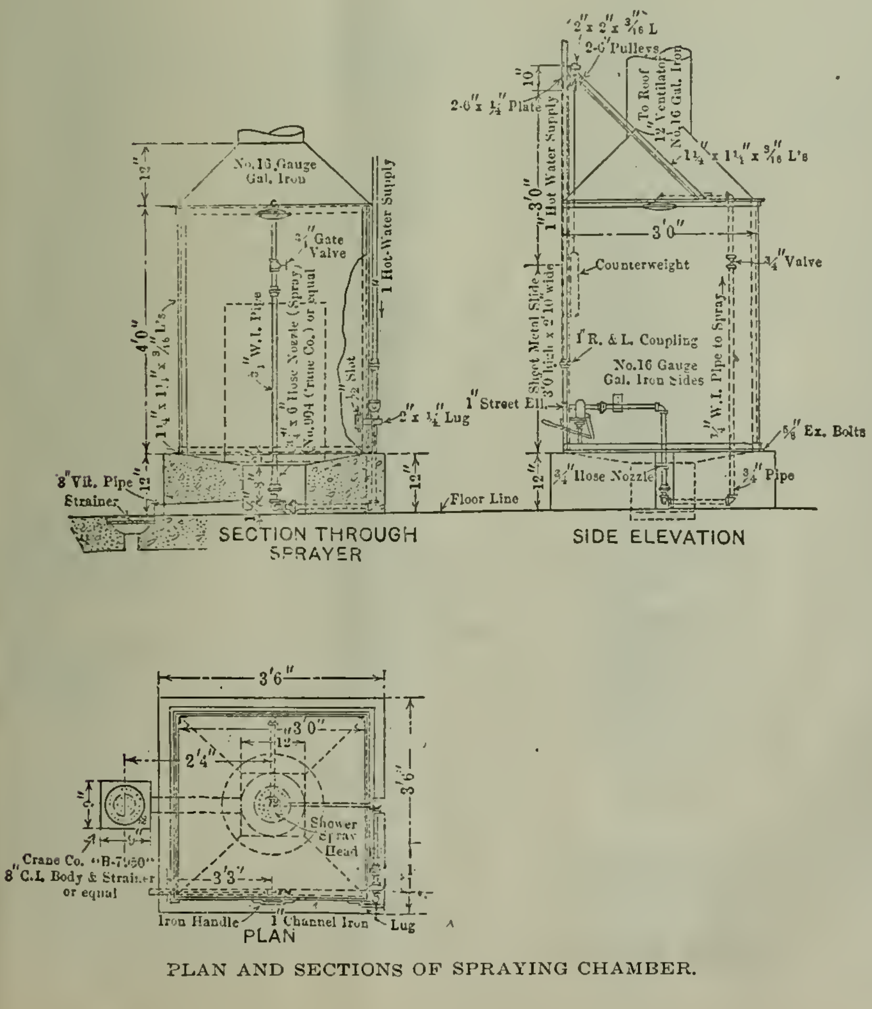
As has already been described in Municipal Journal and Public Works, the plan made for disposing of the garbage of the cantonments was to haul the garbage to transfer stations and there deliver it to contractors, who were required to dispose of it in a satisfactory manner, paying the government for the garbage. The garbage cans were not emptied into wagons, but were carried directly from the company kitchens to the transfer station. There they were thoroughly cleansed and returned to the company kitchen at the next collection.

After some of the first plants had been built, a special design for a can-washing equipment was developed by the Construction Division. Under this plan, cans were placed in long vats or "soaking tanks" containing hot water in which special cleansing compounds had been dissolved, and were allowed to remain in this water a sufficient time to loosen the organic and the greasy material from their surfaces. They were then taken out of the vat and placed in a small chamber constructed of light-weight steel plates and there subjected to a strong spray of hot water, both inside and out, which thoroughly cleansed them. The water from the sprays and from the vats passed through a large grease-intercepting tank or trap before passing into the sewer system. The standard soaking tank was of concrete, 16 feet long, 2 feet wide and 3 feet deep, in which was a removable rack built up of 1¼-inch wrought iron pipe. This rack rested on the floor near one end of the tank and was elevated about a foot from the floor at the other end. At the latter end hot water was admitted from a storage tank and it overflowed through a 3-inch pipe at the other end. The whole tank pitched slightly toward the latter end, where there was a waste opening.

The spraying chamber was a square tank, three feet on a side, interior dimension, and four feet high, made of sixteen gauge galvanized iron resting on a concrete base that slopes toward a 12-inch opening in the center, which opening connected with the grease trap. In the center, at the top, was a shower spray head for applying the hot water, fed by a three-quarter-inch wrought iron pipe. The tank was covered with a conical top terminating in a twelve-inch ventilating pipe extending to the roof. In one side was a sheet metal sliding door three feet high and two feet ten inches wide, provided with a counterweight and an iron handle at the bottom, which door was raised for placing a can in place and then lowered and the spray turned on.



1¼" W. I. Pipe Rack (Removable)
16 0"
3-3¼" ⌀ Rolls, as shown
Concrete
PLAN
Length of Tank to be gover. by Gen'l J.O. D'w'g
Valve
Hot Water from Storage Tank
3" Overflow
Water Line
3" Overflow—Removable, and to have Long Thread on Bottom
1¼" W.I. Pipe
1¼" x 6" Floor Flange
3'0"
Bottom of Tank to Pitch toward Draw-off
Draw-off
SECTION THROUGH CONCRETE SOAKING TANK
5"
2'6"
3'6"
Overflow
18"
1¼" Pipe
4" C.I Pipe
CROSS-SECTION



PLAN AND SECTIONS OF SPRAYING CHAMBER.

# WATER RATES AND FIRE PROTECTION CHARGES

**Data from Several Hundred Cities of the United States—Maximum and Minimum Rates—Changes Since Before the War—Receipts for Public Hydrants and Private Fire Protection.**

FREQUENCY OF READING METERS.

The tabulated data relative to meters published in the June 7th issue gave, among other items, the frequency with which the meters were read. The total number of meters included in the report was 1,976,027, reported by 645 cities. Of these, 224 read the meters monthly, 182 read them quarterly, 36 semi-annually, 5 twice a month, 4 once in two months, and 4 once in three months. Other

METER RATES AND FIRE PROTECTION (Continued).

| City and State. | Municipal or Private. | Rate. | Maximum Meter Rates. For consumption less than | Minimum Meter Rates. |
|---|---|---|---|---|
| **Maryland:** | | | | |
| Baltimore | Municipal | 6½c per 100 cu. ft. | ........ | ........ |
| Cumberland | Municipal | 7c per M | 2,001 per day | 5c per M |
| Hagerstown | Municipal | 30c per M | 10,000 quarterly | 6½c per M |
| **Massachusetts:** | | | | |
| Attleboro | Municipal | 30c per 100 cu. ft. | 1,301 cu. ft. per 6 months | 6c per 100 cu. ft. |
| Barre | Municipal | 50c | 50,000 per 6 months | 25c |
| Belmont | Municipal | 20c per 100 cu. ft. | 1,501 cu. ft. | 15c |
| Cambridge | Municipal | 10c per 100 cu. ft. | ........ | ........ |
| Cherry Valley | Water district | 29c per 100 cu. ft. | 701 cu. ft. | 20c per 100 cu. ft. |
| Chicopee | Municipal | 17c per 100 cu. ft. | 876 | 5c per 100 cu. ft. |
| Danvers | Municipal | 20c | 25,000 per month | 10c |
| Easthampton | Municipal | 12c per 100 cu. ft. | 40,001 cu. ft. per 6 months | 6c per 100 cu. ft. |
| East Weymouth | Municipal | 40c per M | 1,000 daily | 9c per M |
| Fall River | Municipal | 21c per 100 cu. ft. | 26 cu. ft. per day | 7½c per 100 cu. ft. |
| Falmouth | Municipal | 25c per M | 1,000,000 | 24c per M |
| Fitchburg | Municipal | 18c per 100 cu. ft. | 5,001 cu. ft. per quarter | 4c per 100 cu. ft. |
| Franklin | Municipal | 38½c per M | 12,500 | 8c plus 20% per M |
| Hudson | Municipal | ........ | ........ | ........ |
| Mansfield | District | 33 1-3 per M | 30,000 per year | ........ |
| Maynard | Municipal | 37½c per 100 cu. ft. | 5,001 cu. ft. | 10c |
| Milton | Municipal | ........ | ........ | ........ |
| New Bedford | Municipal | 15c per M | ........ | 10c per M |
| Newburyport | Municipal | ........ | ........ | ........ |
| North Attleboro | Municipal | 60c per M | 10,000 per year | 15c per M |
| Northampton | Municipal | 10c per M | 200,000 per month | 6c per M |
| North Easton | Municipal | 21c per 100 cu. ft. | 4,001 cu. ft. per year | 14c per 100 cu. ft. |
| Orange | Municipal | 25c per 100 cu. ft. | ........ | ........ |
| Reading | Municipal | 23c per 100 cu. ft. | 6,501 cu. ft. per 6 months | 12c per 100 cu. ft. |
| Revere | Municipal | ........ | ........ | $10 per family |
| Somerville | Municipal | 12c per 100 cu. ft. | ........ | 8c per 100 cu. ft. |
| Springfield | Municipal | ........ | ........ | ........ |
| Taunton | Municipal | 25c | 1,001 per day | 9c |
| Walpole | Municipal | $12 | 1000.000 gal. | 10c per 100 cu. ft. |
| Waltham | Municipal | 20c per 100 cu. ft. | 45,001 gal. | 11c per 100 cu. ft. |
| Wellesley | Municipal | 27.3c per 100 cu. ft. | 2,201 cu. ft. per year | 18.5c per 100 cu. ft. |
| Worcester | Municipal | 20c per M | 5,001 | 10c per M |
| **Michigan:** | | | | |
| Adrian | Private | 20c per M | 1,001 per day | 10c per M |
| Alpena | Municipal | 10c per M | 501 per day | 4c per M |
| Battle Creek | Municipal | 13c per M | 551 per day average | 4c per M |
| Bay City | Municipal | 10c per M | 10,000 per day | ........ |
| Belding | Municipal | 20c per 100 cu. ft. less 45% discount | 51 cu. ft. per day | 20c per 100 cu. ft. less 62½% discount |
| Benton Harbor | Municipal | 15c | 10,001 | 9c |
| Boyne City | Municipal | 15c per M | 3,000 | 7c per M |
| Coldwater | Municipal | ........ | ........ | ........ |
| Grand Rapids | Municipal | 5c per 100 cu. ft. | ........ | ........ |
| Highland Park | Municipal | $1 per M | 7,501 cu. ft. | 45c per M |
| Holland | Municipal | 10c per 100 cu. ft. | 750,000 gal. | 4c per 100 cu. ft. |
| Houghton | Municipal | 30c | 60,001 | 10c |
| Iron Mountain | ........ | ........ | ........ | ........ |
| Ishpeming | Municipal | 10c per M | 12,501 | 4c per M |
| Jackson | Municipal | 7½c per 100 cu. ft. | 5,001 cu. ft. per month | 5c per 100 cu. ft. |
| Lansing | Municipal | 9c per 100 cu. ft. | 2,001 cu. ft. per month | 4½c ner 100 cu. ft. |
| Ludington | Municipal | 10c per M | Straight | ........ |
| Manistee | Municipal | 13½c per M | 100,001 | 10c per M |
| Manistique | Municipal | 35c per M | 5,001 | 5½c per M |
| Marshall | Municipal | 20c per M | ........ | 10c per M |
| Mt. Clemens | Municipal | 10c per 100 cu. ft. | 2,001 | 8c per 100 cu. ft. |
| Muskegan | Municipal | 5c per 100 cu. ft. | 3,001 per quarter | ........ |
| Niles | Municipal | 16c per 100 cu. ft. | 700 cu. ft. | 6.3c per 100 cu. ft. |
| Norway | Municipal | 30c | 1,000 | 8c |
| St. Joseph | Municipal | 15c per M | 501 per day | 10c per M |
| Traverse City | Municipal | 66c per 100 cu. ft. | 6,001 cu. ft. per quarter | 3c per 100 cu. ft. |
| Yale | Municipal | 15c per 100 gal. | 3,001 gal. | 5c per 100 |
| Ypsilanti | Municipal | 25c per M | 8,001 | 8c per M |
| **Minnesota:** | | | | |
| Chisholm | Municipal | 11.4 straight | ........ | ........ |
| Duluth | Municipal | 15c per 100 cu. ft. | 10,001 cu. ft. per month | 8c per 100 cu. ft. |
| Ely | Municipal | 25c per 100 cu. ft. | 1,001 cu. ft. | 10c per 100 cu. ft. |
| Eveleth | Municipal | 15c per M | 150,001 | 10c per M |
| Minneapolis | Municipal | 8c per M straight | ........ | ........ |
| New Ulm | Municipal | 50c | 1,001 | 10c |
| Rochester | Municipal | 25c per M | ........ | 7c |
| St. Paul | Municipal | 8c per M straight | ........ | ........ |
| St. Peter | Municipal | 30c per M | 20,001 | 15c per M |
| **Mississippi:** | | | | |
| Corinth | Municipal | 35c per M | 3,001 per month | 8c per M |
| Greenwood | Municipal | ........ | ........ | ........ |
| Water Valley | Municipal | 42c per M | 3,000 | ........ |
| **Missouri:** | | | | |
| Boonville | Private | ........ | ........ | ........ |
| Chillicothe | Municipal | 40c per M | 2,001 | 8c per M |
| Farmington | Municipal | 25c per 100 cu. ft. | 501 cu. ft. | ........ |
| Joplin | Municipal | 22½c | ........ | 4⅜c |
| Poplar Bluff | Municipal | 25c | 10,001 | 10c |
| St. Louis | Municipal | ........ | ........ | ........ |
| Trenton | Municipal | 30c per 100 cu. ft. | ........ | 7c per 100 cu. ft. |
| University City | Private | 6½c per 100 cu. ft. | ........ | ........ |

## METER RATES AND FIRE PROTECTION (Continued).

| City and State. | Minimum Meter Rates For consumption more than | Increase since before the war. | City pays for fire hydrants. | Charge for private hydrants or sprinklers. |
|---|---|---|---|---|
| **Maryland:** | | | | |
| Baltimore | ...... | None | Nothing | No charge except cost of installation |
| Cumberland | 3,000 per day | None | Nothing | None |
| Hagerstown | 3,000,000 quarterly | None | Free—old cost $65 per year | $50 per year |
| **Massachusetts:** | | | | |
| Attleboro | 400,000 cu. ft. per 6 months | None | $30 each per year | None |
| Barre | 300,000 per 6 months | None | $25 each | ........ |
| Belmont | 1,500 cu. ft. | None | Nothing | Cost of construction; outlets sealed |
| Cambridge | ........ | None | Nothing | ........ |
| Cherry Valley | 700 cu. ft. | None | $25 | Hydrants free, sprinkler 10c. per head |
| Chicopee | 8,500 cu. ft. | None | $15 per year | Measured by detector meter |
| Danvers | 50,000 per month | Minimum was 6c for over 100,000 gal. | ........ | None |
| Easthampton | 80,000 cu. ft. per 6 mos. | None | Nothing | None |
| East Weymouth | 100,000 daily | None | Nothing | None |
| Fall River | Not more than 7,000 cu. ft. per day | ........ | Nothing | None |
| Falmouth | 1,000,000 | None | $30 per year | ........ |
| Fitchburg | 55,000 cu. ft. per quar. | ........ | Nothing | None |
| Franklin | 150,000 per day | None | $35 + 20% | Average $150 per year for 1,000 heads |
| Hudson | ........ | None | $900 | None |
| Mansfield | ........ | 6,000 gal. less for $10 | $15 each | None |
| Maynard | 60,000 cu. ft. | None | Nothing | Metered—no other charge |
| Milton | 4,800 cu. ft. | None | $9,000 | Cost of installation |
| New Bedford | Mfg. | None | Nothing | None |
| Newburyport | ........ | None | $3,500 per year | None |
| North Attleboro | 500,000 | None | 267 hydrants $7,000 | None |
| Northampton | 200,000 per month | None | Nothing; ought to pay | Fire protection free |
| North Easton | Less than 300,000 cu. ft. per year | None | No charge | Sprinklers 20c. per 100 cu. ft. |
| Orange | ........ | None | $5,500 | None |
| Reading | 33,500 cu. ft. | None | $30 each | None |
| Revere | ........ | None | Nothing | None |
| Somerville | 1,000,000 cu. ft. per quarter | None | Nothing | None |
| Springfield | ........ | None | $25 each, credited | None |
| Taunton | 50,000 per day | None | Nothing | None |
| Walpole | 5,000,000 gal. | 40% | Nothing | None |
| Wellesley | 45,000 gal. | None | $5 each per year | None |
| Worcester | 2,200 cu. ft. | None | $10 each per year | Sprinkler service free, charge cost for installation |
| Waltham | ........ | None | Nothing, but should be | None, but should be |
| **Michigan:** | | | | |
| Adrian | 4,000 per day | None | $100 each per year | $50 per year |
| Alpena | 50,000 per day | None | $25 each per year | None |
| Battle Creek | 500,000 per day average | None | Only 10 or 15 non-metered | None |
| Bay City | ........ | Increase proposed | None | None |
| Belding | 7,500 cu. ft. per day | None | 59 hydrants $50 each | No charge |
| Benton Harbor | 100,000 | Raised from 11c. flat rate | Nothing | Only for water used |
| Boyne City | 10,000 | None | $25 each | Have none |
| Coldwater | ........ | ........ | $4,000 per year for 126 hydrants & sewer service | Cost of construction |
| Grand Rapids | ........ | None | $30 each, will be $32.50 coming year | $50 per year for 6" service or less, $75 for over 6" |
| Highland Park | 4,020,000 gal. | Not until 1920 when supplying filtered water | None | None |
| Holland | 2,250,000 gal. | None | $35 each per year | None |
| Houghton | 60,000 | None | Nothing | None |
| Iron Mountain | ........ | Proposed | $58 per year | ........ |
| Ishpeming | 25,000 | None | Nothing | Meter rate |
| Jackson | 5,000 cu. ft. per month | Proposed | Nothing | None |
| Lansing | 235,000 cu. ft. per month | 18% | $25 each per year | None |
| Ludington | ........ | None | $40 each per year | Metered |
| Manistee | 100,000 | None | Nothing | None |
| Manistique | 400,000 | None | Nothing | None |
| Marshall | ........ | None | $25 each per year | None |
| Mt. Clemens | ........ | Proposed | Nothing | None |
| Muskegan | ........ | None | $10 per year | None |
| Niles | 12,700 cu. ft.; 10% disc. | Proposed | Nothing | None |
| Norway | 10,000 | None | $35 | $35 for hydrants |
| St. Joseph | 10,000 per day | None | Should pay $35, but doesn't | None |
| Traverse City | 120,000 cu. ft. | None | $35 per year; $300 for street sprinkling | ........ |
| Yale | 3,000 | Should be raised | $24 each per year; should be $36 | None |
| Ypsilanti | 8,000 | None | $35 | Have none |
| **Minnesota:** | | | | |
| Chisholm | ........ | Under consideration | $1 per capita per year | None |
| Duluth | 20,000 cu. ft. per month | None | $50 per year | $1 per inch of service size per month |
| Ely | 8,000 cu. ft. | Reduced 10% | $4,254 | ........ |
| Eveleth | 1,000,000 | None | $35 each per year | None |
| Minneapolis | ........ | None | ½ rate | $5 per year |
| New Ulm | 150,000 | 25% | $35 each | Meter rates |
| Rochester | ........ | None | $32.50 | Special rate |
| St. Paul | ........ | None | $14 each | 4" sprinkler connection $25 per year, 6"—$50; no charge for private hydrants |
| St. Peter | 50,000 | None | $50 each per year credit | Have none |
| **Mississippi:** | | | | |
| Corinth | 30,000 per mo. | None | $50 per month | None |
| Greenwood | ........ | 15% | Nothing | 5c. per head per year |
| Water Valley | ........ | 15% | Nothing | ........ |
| **Missouri:** | | | | |
| Boonville | ........ | 20% | ........ | Have none |
| Chillicothe | 1,000,000 | Decided reduction | Nothing | No charge |
| Farmington | ........ | None | $5 each per year | All metered |
| Joplin | 1,000,000 | Proposed | $22.50 per year | $22.50 & 5c. |
| Poplar Bluff | 20,000 | None | Nothing | None |
| St. Louis | ........ | ........ | ........ | ........ |
| Trenton | ........ | 4 large consumers, about 2% | Nothing | Have none |
| University City | ........ | None | $60 each per year net | $50 per hydrant per year |

intervals between readings are given as once in six weeks, eight times a year and once in four months.

The remainder make a distinction between large meters and small ones, reading the larger more frequently than the domestic. Of these, 60 read the large ones monthly and the small ones quarterly; 12 read them monthly and semi-annually; 2 read them quarterly and semi-annually; 2 read the large ones once a month and the small ones once in two months; while there is one city using each of the following combinations: Weekly and bi-monthly; weekly and semi-annually; quarterly and annually; quarterly and bi-monthly; quarterly and weekly; quarterly and every ten days; quarterly and daily; once in two months and once in six months; monthly and quarterly, and once in two to four months.

Eighty-six cities make readings and send out bills for different parts of the city at different times, thus distributing the work over the entire year and reducing the amount necessary to be done at any one time. Several of these cities indicate the number of districts and of corresponding billing periods, 11 dividing the city into three districts, 3 into two districts, one into ten districts and one into six. On the other hand, 344 cities report that readings throughout the city are all taken and bills rendered at the same time.

## WATER CONSERVATION IN THE CANTONMENTS.

It has been assumed, in planing the contonments, that an allowance of 55 gallons of water per capita would be sufficient, but this was exceeded in most of the camps, the average for January 1919 reaching 123 gallons in Camp Grant, while the minimum was 42 gallons at Camp Taylor, and the average of all the National Army Contonments was 72.7 gallons.

An inspection showed that ball cocks on flush tanks were leaking in about half the latrines, as were also a large percentage of the shower heads. Some saving was effected by lowering the float balls in the flush tanks, and by one contrivance or another for reducing the rate of discharge from the shower heads.

Considerable ingenuity was shown in the different camps in the plans employed for diminishing the rate of delivery from shower heads and from faucets, and these proved to be the most successful means of reducing waste. At one camp there was inserted back of the faucet a piece of 1/8-inch tubing, at another a tin button with two thread holes, at another a glass marble; but the most popular device was a tapered lead plug with a 1/16-inch to 3/32-inch orifice, the size depending on the pressure.

It was thought that there was probably considerable underground leakage, partly due to the haste with which the systems were installed; this idea being supported by the high night rates. Investigations did not support this idea, however. The majority of the cantonments have wood pipe for their distribution mains, these totaling 3½ million feet or more than 600 miles. One of the partial exceptions is Camp Dix, where there is about twelve miles of wood pipe and six miles of cast iron with leadite joints. A water-waste survey at this camp showed that, of the night rate of 25,000 gallons per hour, nearly 17,000 was accounted for as legitimate use and waste through plumbing fixtures, and 4,000 was used in filling a railroad water tank; leaving only about 4,000 gallons per hour as underground loss through mains and service pipes. At Camp Grant the underground loss from 55,900 feet of service pipe and 48,840 feet of mains was at the rate of 35,588 gallons per twenty-four hours.

## PATROL MAINTENANCE IN ESSEX COUNTY.

For a number of years past Essex county, N. J. has operated the patrol system of maintenance successfully over the entire network of its highways. About 75 miles of road are telford macadam and this type of road has proved to be increasingly expensive to maintain under the heavy traffic that passes over it. With the tremendous increase in the use of motor trucks carrying the legal limit of fifteen tons and the increasing number of swift pleasure vehicles, it is impossible to keep broken stone roads in an acceptable condition of repair. In spite of careful attention of patrolmen, they are constantly deteriorating.

There are in the county 80 miles of more durable pavement such as granite block, asphalt block and bituminous concrete of different kinds, most of which have been constructed during the past six years. These types of pavement have more than proved their value, for it has not been necessary to spend anything whatever for repairs on them since they were laid. The length of section on these more durable roads that can be covered by a patrolman is double and in some cases treble the length of section practicable in the case of broken stone roads. On the better class of pavement the work of the patrolmen is confined almost entirely to keeping the gutters clear, the culverts unobstructed and the earth shoulders between the pavement and gutter cleared of vegetation.

The total cost of the patrol system for last year amounted to $32,096 for labor and $27,541 for broken stone; in addition to which, county road rollers and the county truck were used at a total cost for the year of $2,183.

## PATROL MAINTENANCE IN MAINE.

The highways of Maine were maintained during 1918 by the patrol system. A total of 480 patrolmen cared for 4,235 miles of road, of which 592 miles was improved state highway, 769 miles was improved state-aid highway, and the remaining 2,874 miles was unimproved road. Of the improved roads, much the larger part had a gravel surface, although there were a few miles of bituminous macadam.

The roads patrolled included substantially all of the state highway system, improved and unimproved, and practically all the state-aid roads. In its annual report the State Highway Commission says that, had it not been for this system of caring for the main arteries, many of the roads would have fallen into a bad state of disrepair on account of the shortage of labor. In many of the towns of the state it was impossible to secure labor to do state-aid work and for the same reason many of these towns found it impossible to carry on ordinary maintenance work as completely as they would have wished.

The total expenditure for maintenance for both labor and material was $568,800, which included $18,652 furnished by the state for road machine work. In addition, the state furnished supervision and inspection of the work amounting to $21,092, making the total gross expenditure chargable to maintenance $589,892. Of this total amount, the cities and towns furnished about $202,000. The average maintenance expenditure per mile was $136.44. On the improved state highways the expenditure for labor, material and supervision averaged $338.23 per mile, while the average expenditure on other roads was $99.46 per mile.

# The WEEK'S NEWS

**New Bill Proposes Federal Highway Department—Canada Issues $20,000,000 Bonds for Roads—New Hydroelectric Plant Construction for Seattle—Consulting Engineer Is Elected Mayor of Oklahoma City—Two-Platoon System in Fort Worth—Baltimore Fire Department All Motorized—Seattle's Car Line Profitable—Street Car Subway for Pittsburgh—New York State Commission Has Power to Raise Fares—Nevada and Kansas Fight High Cement Prices.**

## ROADS AND PAVEMENTS

### Another Bill for Federal Highway Department.

Washington, D. C.—A bill has been introduced in the House of Representatives by representative Osborne of California to establish a national highway system, to promote efficient and economical highway transportation, and amend the Federal Aid roads law so as to create a Department of Federal Highways. The bill is similar in general purpose to the Townsend Highway bill, but appropriates a much large amount of money, and establishes a new government department with a new cabinet portfolio instead of a commission. The bill would appropriate $1,700,000,000, divided as follows: $100,000,000 to become available 30 days after the enactment of the bill, $200,000,000 for the fiscal year ending July 1, 1920, and a like amount for each of the following seven years. All of these sums would remain available until expended. The bill also provides for a secretary at a salary of $15,000 per annum, appointed by the President and confirmed by the Senate, and as assistant secretary at $10,000, with other needed employes. The force would be under the classified civil service. Following is a summary of the bill:

> The department would provide a connected system of highways sufficient to maintain interstate commerce, furnish adequate post road facilities and provide for the national defense. It would establish trunk lines of national highways (a) from the Atlantic to the Pacific (not less than three in number), (b) from the northern to the southern boundary of the United States (not less than two in number) and (c) intersecting and feeder lines (not less than two) in each state. These trunk line roads would form a national highway system. The secretary of federal highways would determine (1) the routes upon which national highways would be constructed, (2) the highways to be included in the system, and (3) the order in which they are to be built and maintained. In making selections he would be required to keep in mind the formation of a national system of trunk line roads with intersecting and connecting highways adequate for the purposes of the bill. The secretary would have charge of all work in connection with the construction, maintenance, etc., of these roads, preparing estimates, plans, specifications, and might make arrangements with states, counties and municipalities for the taking over and administration as part of the federal highway system of roads in these subdivisions. The roads included in the national highway system would be built and maintained entirely at the expense of the United States, and administered through the secretary of federal highways. Beginning July 1, 1919, and annually thereafter until the first day of July, 1926, the secretary of the treasury would be authorized to issue national highway bonds to the amount of the appropriation provided for that year. The rate of interest, time, etc., as to each issue would be determined by the secretary of the treasury.

### New York State Council of Federal Highway Council.

New York, N. Y.—The New York state representatives of the Federal Highway Council met recently in the United Engineering Societies Building, New York City, to organize the New York State Council. The object of forming the council is to secure the enactment by the Congress of the United States of legislation embodying the principles set forth in the Townsend Bill providing for the creation of a Federal Highway Commission and the construction and control by the United States Government of a system of National Highways with funds appropriated by the Federal Government. To assist in accomplishing this object, there will be appointed county representatives of the council throughout the State of New York, who will be instructed to secure the support of the Townsend Bill by local organizations through passage of resolutions and appeals to their representatives and senators in Congress. The following officers were elected: Chairman, Arthur H. Blanchard, president, American Road Builders' Association and National Highway Traffic Association; vice-chairman, D. C. Fenner, past-president, Motor Truck Association of America; George M. Graham, manager, Pierce-Arrow Motor Car Company; Hon. Frederick S. Green, New York State commissioner of highways; Edward J. Mehren, editor, Engineering News-Record; Col. Theodore Roosevelt; secretary-treasurer, H. W. Perry, manager, Trailer Manufacturers Association of America.

### $20,000,000 Highway Bond Issue for Canada.

Toronto, Canada.—A bill providing for government aid to encourage the construction and improvement of highways amounting to a sum of $20,000,000 has been passed by both houses and approved by the Governor General. The bill calls for appropriations of $20,000,000 during a period of five years. Of that amount, $80,000 is to be granted to each province each year, and the balance is to be allowed in proportion to the population of the respective provinces of the Dominion. The bill provides that grants are to be made only in consideration of work actually done for the improvement of particular highways and in accordance with agreement between the federal government and the province concerned. These agreements shall set forth the cost, description and specifications of the proposed highway and the manner in which the work is to be supervised by the federal and provincial officials. The aid to be given by the federal government is to be 40% of the actual and necessary cost of the construction, and the expenditures are to be made by tender and contract, unless for special reasons the governments of the Dominion and the province concerned agree to a different method of procedure.

## SEWERAGE AND SANITATION

### City Must Pay for Canal Harbor Pollution.

Syracuse, N. Y.—Every day that sewage flows into the barge canal harbor is costing the city more than $100, according to a bill sent to the city. The state engineer and surveyor, through Guy P. Moulton, his local deputy, submitted several weeks ago a bill for approximately $25,000, alleging that the city, by reason of its failure to provide for the disposal of its sewage, was filling up the barge canal harbor with a deposit that threatened to interfere with navigation. According to Mr. Moulton, the bill represented the actual cost to the state of a contract for its removal, based on an estimated number of cubic yards of silt on the bottom of the harbor. The estimate was based on the condition of the harbor in March, however, and the municipal administration asked for another estimate complete to July 1. The bill, in the opinion of the city's legal advisers, must be paid. These bills have resulted in the mayor's recent order to the sewer board to "speed up" its work this year. The board has been ten years trying to make up its mind what kind of a sewage disposal plant to build, first buying Lakeview Point, then rejecting it and then going back to it again by order of the courts. Several months ago, it was announced that Glenn D. Holmes, the board's consulting engineer, would endeavor to work out some plan of a preliminary or temporary, treatment of sewage at the point where it reaches the harbor. The state board of health, as well as the state engineer, has ordered some action taken, but so far little has been worked out. Sewage in an amount estimated at 90 per cent of the entire volume from the intercepting sewers is now flowing directly into the harbor, covering the water with a coating of scum and filling up the harbor bottom with a deposit. Complaints from users of the harbor, as well as from residents of the vicinity, have been filed frequently as a result of the odor. Mr. Moulton, division engineer in charge of this section of the barge canal, declined to hazard an estimate as to how much the state would ask as payment for cleaning up the harbor to July 1. Based on his previous bill, however, the figure would be close to $50,000, indicating that it costs the city treasury between $100 and $150 every day that the sewer board delays.

### To Build Sewage Disposal Plant.

Fort Worth, Tex.—John H. Gregory, consulting engineer of New York, who designed the city's filtration plant, has been here in consultation with water commissioner J. C. Lord relative to the construction of the municipal sewage disposal plant. The plant will cost $72,800 and will be erected in the eastern suburbs on a tract of six acres recently purchased by the commissioner. The bond issue for the sewage disposal plant was recently sold and the funds will be available in a short time. The plant will be erected in conformity to the McNealus anti-stream pollution law, which forbids cities and towns from emptying sewage into streams, as was the custom in the old days. The Trinity has been used as a receptacle for the Fort Worth sewage for many years, and in the heat of the summer, when the water in the channel was low, often became so foul that the fish died and the odor was fearful. Dallas complained bitterly against this state of affairs, and residents along the stream below the city entered protests. The McNealus law was devised as a remedy.

### City, State and U. S. Fight Malaria.

New Orleans, La.—Efforts to drive malaria from New Orleans and Louisiana will soon be started, according to Dr. Oscar Dowling, president of the Louisiana state board of health. Dr. Dowling announced that a co-operative program to be carried out by the United State Public Health Service, the state and city has been prepared and that within a short time three experts of the federal health service will arrive in New Orleans to make the necessary survey. When the survey is completed the work of draining and oiling the breeding places of the malaria-carrying mosquito will be immediately begun. While it is expected the cities and towns in which this work will be conducted will pay as much as practicable of the cost incident to the perfecting of the actual control measures the remainder of the cost—one-half—to be borne equally by the International Health Board and the Louisiana state board of health. After the survey has been completed by the sanitary engineers of the International Health Board, whose salaries and traveling expenses are to be paid by the public health service, budgets for each town will be prepared, based upon the estimated cost for such work in such towns which will be submitted by the sanitary engineers.

## STREET LIGHTING AND POWER

### Commission Allows Higher Rates Despite Inefficiency.

Golden City, Mo.—Increased rates have been allowed the Golden City Electric Light Company by the state public service commission. The commission decided that evidence as to inefficienct electric service, not urgently pressed, with reference to minor defects of a small electric utility—momentary dimness of lights and failure to supply energy early enough on dark evenings—requiring an impracticable expenditure for the installation of rectifying machinery in view of the small revenue derived from the service, is not sufficient to stay a proposed increase in rates, in themselves not yielding a fair return, to utility not earning operating expenses. It was also held that a small electric utility furnishing direct-current service to consumers on a flat and meter rate basis is not required to install an all-metered service, as direct-current meters are not as satisfactory as alternating-current meters and the high cost of installation would impose an unnecessary burden upon the company which would eventually fall upon the consumers.

### City Electric Plant to Use Oil Fuel.

Taunton, Mass.—The municipal council has approved an expenditure of $30,000 for the installation of oil-burning equipment to replace the present coal-burning furnaces. Warren B. Lewis, consulting engineer, Providence, R. I., has recently taken over the management of the plant, and has decided that, with present prices of coal and oil and with due accounting for labor requirements in handling the two fuels, the plant will save $40,000 a year by the installation of oil-burning apparatus. Barges will deliver the oil by water, and tanks will be provided permitting two months' operation as a safeguard against winter shipping tie-ups.

### Urges City Hydroelectric Plant Construction.

Seattle, Wash.—According to J. D. Ross, superintendent of the city's municipal power plants, the city should immediately begin construction of the first unit of the Skagit project. The present industrial outlook in the Northwest, in his opinion, justifies the city in preparing for the eventual development of 45,000 hp. By the time the first unit of the Skagit project, which Mr. Ross considers the greatest opportunity in the Northwest, is completed, a market will have been found for the power and the second unit will be needed also. Immediate construction is necessary, he feels, because if private interests get control of the Skagit power the Seattle municipal plant would be forced to close owing to inability to compete. The present cost of energy per kilowatt-hour at the company's Cedar River (hydroelectric) plant is 3.47 mills, and at the Lake Union (steam) plant 12.97 mills. Operating the two plants as one unit, the average cost of energy produced by the company's plants is 5.61 mills. The cost of producing energy in the first unit of the Skagit plant, taking into consideration conditions under which the present plants operate, is estimated at 2.67 mills. This shows the cost of producing energy to be nearly 3 mills below the cost of energy produced by the combine steam and Cedar River plants. Superintendent Ross says that the cost of fuel oil alone at the steam plant will more than pay the cost of operation of the Skagit plant for a year, including interest and depreciation.

## GOVERNMENT AND FINANCE

### Consulting Engineer Elected Mayor.

Oklahoma City, Okla.—Recognition of demonstrated engineering ability is seen in the result of the the recent election to the office of mayor of this city of J. C. Walton, consulting engineer of the firm of Mackintosh-Walton Company. Previous to this election, Mr. Walton was commissioner of public works of the city, having charge of the department of engineering. The efficient manner in which his department handled the straightening of the Canadian river through the city, elimination of grade crossings, a Union Depot project, an intercepting sewer, a sewage disposal plant, and other municipal problems resulted in the choice of Mr. Walton as mayor when his term as commissioner was but half completed. Mr. Walton still retains his engineering interests through his connection with the Mackintosh-Walton Co., and as president of the Oklahoma chapter of the American Association of Engineers.

### City Appoints Consulting Engineer for Four Years.

Monroe, La.—With a number of important improvements projected, the city commissioners have engaged Walter G. Kirkpatrick, formerly city engineer of Birmingham, Ala., as consulting engineer and director of public works for a term of four years. Mr. Kirkpatrick investigated municipal needs in Monroe in 1916, but the war prevented the carrying out of the extensive program he recommended. Since then the commission form of government has been adopted and the new commissioners are going ahead with the work. Believing that competent engineering supervision is necessary to get results, they have appointed Mr. Kirkpatrick at a salary of $10,000 a year. He will design and supervise about two million dollars' worth of improvements, and also serve in an advisory capacity in all departments of the city government. While the duties will be somewhat in the nature of those of a city manager, the executive functions remain with the commissioners, the engineer being called upon constantly for technical information and advice. The improvements will include new water works, with a filtration plant; a new drainage system; enlargement and improvement of the sewer system; a new electric power station; improvement of the municipally owned street railway; garbage disposal; general street improvements; a municipal wharf, etc.

## FIRE AND POLICE

### Voters Approve Two-Platoon System.

Fort Worth, Tex.—Firemen of Fort Worth were voted shorter working hours in the recent election and the changes are now in effect. The fire fighters were on duty twenty-four hours daily with only one day off in seven, but now they work twelve hours and rest twelve hours. The double platoon system will cost $48,000. The system was approved by a vote of 1,126 to 183. According to fire chief Bedeker, the double shift will result in the force being increased from 100 to about 150 men.

### Baltimore's Fire Department All Motorized.

Baltimore, Md.—The complete motorization of the fire department has been announced. The motor equipment at present consists of: 20 steam fire engines, 20 combination hose wagons, 23 gasoline combination piston pumping engines and hose wagons, 12 aerial trucks, 7 combination trucks equipped with chemical tanks, 5 high pressure hose wagons, 2 water towers. In addition to the above, runabouts are provided for chief officers and motor trucks and cars for repair division and fire alarm telegraph service. In the statement the following was given as the percentage of motorization of the various large cities throughout the United States:

| City | Per Cent. | Horses. |
|---|---|---|
| New York | 70 | 750 |
| Philadelphia | 48 | 402 |
| Boston | 54 | 196 |
| Cleveland | 50 | 60 |
| Cincinnati | 65 | 68 |
| Detroit | 60 | 126 |
| St. Louis | 33 | 211 |
| Pittsburgh | 62 | 112 |
| Washington | 55 | 138 |
| San Francisco | 95 | 70 |
| Buffalo | 54 | 170 |
| New Orleans | 45 | 113 |
| Los Angeles | 75 | 60 |
| Baltimore | 100 | None |

## TRAFFIC AND TRANSPORTATION

### Municipal Car Line Makes Profit.

Seattle, Wash.—According to a report by superintendent Thomas F. Murphine, the municipal railway during the month of May showed greatly increased service and a large gain in revenues compared with the corresponding month of May of last year. The city operated during May, 1919, a total of 148,758 car-hours, or 33,225 more car-hours than in May a year ago, or 4153 eight-hour days of service more than was provided in May, 1918. The figures include the combined lines of the Puget Sound Traction, Light & Power Company, and the Municipal divisions "A" and "C." The report also shows that 260,347 more car-lines were operated last month than in May of last year by both railway systems. The revenues from all sources for May of this year totaled $439,932, a gain of $18,680 over April of this year, and an increase of $66,637 over May of last year. Operating expenses are shown to be considerable higher, due to increased wages in the car shops, payment of time and a half overtime, and to an increase, in some instances, in service. The report estimates a net profit of $5,301 for the month. The city council has passed ordinances appropriating $500,000 for betterments and extensions of the railway, the appropriation being a loan from the general and electric railway funds to enable the railway department to start work immediately on a number of important improvements. One of the most important of these works to be undertaken at once is the double-track line on Avalon Way, West Seattle, to cost $60,000. This will provide a direct route to that suburb on a much easier grade.

### Pittsburgh Votes for Street Car Subway.

Pittsburgh, Pa.—Among the $22,000,000 bond issue projects approved by the voters, $6,000,000 is provided for a downtown subway loop for the street cars. The question submitted to the voters did not specify details of construction, except that the tube is to be located in the two downtown wards and be built to specifications to be drawn up by the mayor and council by ordinance. Tentative plans prepared by city engineers and used in the campaign preceding the special election, provide for construction of an underground loop approximately 1½ miles long. This is planned as a downtown terminal for a majority of the surface lines of the Pittsburgh Railways, to which it is proposed to lease the tube. The subway, according to the tentative plans, is to be double-tracked, traffic to be in the same direction on both tracks, every car using it to make the whole loop. Four portals are planned, at which surface cars will pass in and out, and six loading platforms. It is not planned at first to route cars from the northside section to the city through the subway. While the whole project is based upon the assumption that the subway will be leased to the Pittsburgh Railways, no agreement has been entered into with that company as yet, and as far as is known its officials have not been approached in the matter. The lines of the company are being operated by receivers now. While it seems the city plans the subway terminal as a start toward a more extensive underground traction system, it has been put forward primarily as a means of relief from congestion in the downtown section. Construction is expected to start within sixty days.

### Court Decides Commission May Raise Fares.

Buffalo, N. Y.—By a very important decision of the Court of Appeals at Albany, the state public service commission for the second district is declared to have authority to raise fare in Buffalo above 5 cents. The decision holds that the legislature, to which, under the Milburn agreement between the city of Buffalo and the International Railway, power was specifically given to adjust fares under the franchise, delegated this jurisdiction to the commission when it passed the public service commission's act in 1907. As a result, the court holds that in deciding in favor of the rate-making power of the commission it is not overriding but enforcing the conditions of the franchise.. The particular aspects of the Buffalo case are described in judge Cardoza's opinion, which says in part:

> On Jan. 1, 1892, the Buffalo Railway, the West Side Street Railway and the Cross Town Street Railway covenanted with the city of Buffalo for a sufficient consideration to abolish transfer charges and established a uniform fare of 5 cents for a continuous trip upon any portion of their lines. That is the Milburn agreement which was thereafter ratified by the Legislature.
>
> None of these roads was then subject, in the enjoyment of its franchise, to any condition imposed by the local authorities affecting rates of carriage. Some of the franchises went back to days when the consent of the local authorities was not required by the constitution. None had been coupled with any conditions in respect to rates except such conditions as had been imposed by the Legislature itself. The power to supervise and regulate has been exercised by the Legislature in the past and against these very roads. The Milburn agreement made no attempt to escape its exercise in the future.
>
> On the contrary, there was express provision that "nothing in this contract contained shall be construed to prevent the Legislature from regulating the fares of said company or either of them." The companies signing that agreement, together with the Buffalo Traction Company, were later con-

solidated under the name of the International Railway. From time to time, upon the application of the consolidated company, the local authorities gave consent to extensions of the routes, and in so doing again limited fare to not more than 5 cents.

At the same time, however, they provided that "all the terms provisions and conditions of the Milburn agreement should be deemed a part of the consent." They thus reincorporated the covenant that the fares should remain subject to regulation by the Legislature.

In December, 1916, the city of Buffalo, believing the fare to be too high, petitioned the Public Service Commission to fix a just and reasonable rate. For nearly two years that proceeding remained dormant. The war was at hand, and with it came enormous increase in the cost of maintenance and operation. The question was no longer whether rates should be lowered. The question was whether there was not need, if bankruptcy was to be averted, that rates should be increased.

The Council of the city of Buffalo passed a resolution consenting to an increase, but a referendum was demanded and the resolution was vetoed by the electors. The company then turned for relief to the representatives of the State at large. It answered the dormant petition on file with the commission. It said that the rates, instead of being too high, were too low, and joined in the city's prayer that they be considered and revised. The commission refused to accept the answer on the ground of want of power. The special term granted a mandamus. The proceeding was afterward changed by amendment into one of certiorari. The appellate division annulled the ruling of the commission and contended the proceeding for hearing and decision. Upon the appeal hereafter allowed to this court the following question has been certified: "Has the Public Service Commission jurisdiction and power under the facts shown in this proceeding to regulate the rate of fare to be charged by the respondent for the transportation of passengers in the city of Buffalo?"

We think the power must be upheld. This is not a case where demand is made upon the commission to abrogate a defeasance reserved by the local authorities as one of the conditions of a franchise. This is a case where the local authorities in imposing a condition, have consented that the Legislature may change it, and have thus renounced the right of forfeiture or revocation that might otherwise be theirs.

There is nothing to show, and we have no right to assume, that the reservation of the power of the State was for the benefit of one of the parties with exclusion of the other. The power to regulate rates is the power to increase them if inadequate just as truly as it is the power to reduce them if excessive. The Public Service Commission is the delegate of the Legislature and regulation by one is regulation by the other.

The situation then, is this: Municipality and railroad have joined in the declaration that the rate fixed by their agreement shall be not final, but provisional. It is subject, in case of need, to re-examination and readjustment by the agents of the State. The need that was foreseen as possible has arisen. In upholding the jurisdiction of the commission to deal with it, we do not override the conditions of the franchise. We heed and enforce them. There are times when the police force modifies a contract in spite of the intention of those who have contracted. Here its action is in aid of their intention. The covenant which limits rates is a condition of the consent, but only in equal measure with the covenant presented and defining the power of amendment. So far as the power of the commission is concerned, the situation is the same as if no condition had been imposed at all.

### Chicago Council Favors Railroad Electrification.

Chicago, Ill.—The Illinois Central and Michigan Central railroad companies' property located in this city will ultimately be electrified, it is expected, following the passage of an ordinance by the city council. This is the result of an agreement between the Illinois Central railroad, the Chicago South Park commissioners and the city of Chicago which was reached after eight years of negotiation. This entire lake front improvement and reclamation project involves an expenditure of about $118,000,000, of which the electrical installation is estimated to cost $23,500,000. The Illinois Central railroad officials figure that it will cost $8,000,000 to electrify the suburban service, that $3,200,000 will be required for the through passenger service and $1,500,000 for the electrification of the freight and other services. The Michigan Central installation will probably cost about $1,800,000. The ordinance does not specify technical details which might hamper the railroads in the choice of their electrical equipment, nor is any method specified for applying the energy to the trains. The ordinance permits the use of any motive power the operation of which is not accompanied by the emission of smoke, steam and cinders, noxious gases or by noises more objectionable than those produced by electrical operation. The only operating requirements are that reasonable, practicable and efficient methods and devices must be used for overcoming interference with telephone, telegraph and other circuits, and that the methods recommended by the American Committee on Electrolysis be used to prevent damage to water mains and other pipes. Within two months after the ordinance goes into effect the railroad company must begin the preliminary reconstruction work. Two years after this work on electrification proper is to begin. The operation of the whole suburban service must commence seven years after the ordinance goes into effect. Other services are given longer periods, varying from twelve years for freight to twenty for the entire passenger service. The ordinance will become effective when it has been signed by the mayor and accepted by the railroad companies and the South Park Commissioners and has also been approved by the Secretary of War and the Director-General of Railroads. All differences between these parties were eliminated by the long negotiations, so that it is expected that all will sign within the specified periods—six months each for the railroads and the South Park Commissioners and three years for the federal authorities. When all have accepted the plan, it becomes a contract between the city, the South Park Commissioners and the railroads.

### Town to Operate Street Railway.

Sharon, Mass.—This town will soon begin operation of the former Norwood, Canton & Sharon Street Railway. The property was sold for wreckage purposes recently to the Dominion Iron & Wrecking Company, of Canada. The town will proceed upon authority of an act passed by the legislature of 1918, which allows municipalities to finance the operation of electric railways by the assessment of a tax of not over $1 per $1,000 valuation. The act was passed as a war measure but still remains in force on the statute books. It is planned to sell stock to the citizens at $50 a share, an allowance of 6 per cent interest being accorded as a part of the regular operating cost of the road. A stock company composed of citizens was formed recently with the following officers: President, Vernon S. Hawkins, of the board of selectmen; clerk, postmaster Joseph L. McGrath; treasurer, S. G. Spear; directors, Frederick A. Prince and C. V. Reynolds. The road barely escaped being junked, the town coming to the rescue just in time to prevent dismantling.

## MISCELLANEOUS

### May Construct State-Owned Cement Mill.

Carson City, Nev.—The state legislature has passed, and the governor has signed an act authorizing him to appoint a commission of three to investigate the possibility of the construction of a cement plant for the state. This act authorizes the state board of examiners to prepare and issue bonds in the sum of $100,000, the proceeds from the sale of which bonds are to be appropriated for the purpose of constructing and equipping such cement plant. This commission is to make a report of its findings to the session of the state legislature which will meet in 1921.

### State Sues Cement Companies for Price-Fixing.

Topeka, Kans.—The state attorney general has filed ouster suits against seven cement companies of Kansas in the state supreme court. According to statements, the suits follow extensive investigations made by the attorney general's office, based on charges that the cement companies have formed a trust, in violation of state laws, to fix cement prices. The petition asks that charters, franchises and business rights of the seven companies be forfeited, that restraining orders against continuing their combination be issued, that the property of all the companies be placed under the control of the court, that receivers be appointed, and finally that each company be fined not less than $100 for each day it has violated the anti-trust law. The petition charges that the cement companies bound themselves not to sell, manufacture, dispose of or transport cement below a common standard figure which is termed excessive; that the companies have entered into a secret agreement to sell cement in Kansas at a uniform price, and add to said price and charge to the purchaser an amount equal to the railroad freight charges, not from the point of production to the point of delivery, but from the city of Iola, Kan., to the place of delivery, and that the companies agreed unlawfully to divide the territory of Kansas among themselves, to the end that in certain portions of the state certain companies have the exclusive right to fix the price of cement.

# LEGAL NEWS

## A Summary and Notes of Recent Decision—Rulings of Interest to Municipalities

### Contractor's Default—Right of City to Use Materials.

(N. Y. Sup.) A provision in a construction contract, giving a municipal corporation right to take possession of materials upon the contractor's default and to use the same to complete the building, was valid.—Wilds v. Board of Education of City of New York, 174 N. Y. S. 375.

### Broken Contract for Garbage Reduction—Health Regulation

(Conn.) Where a corporation breached its contract for reduction of garbage by refusing to receive further garbage and city entered into contract with a different concern, new contract embodying minor changes favorable to city, the second contract could not be used as fixing definitely and precisely the extent of city's damage, but it could be used as a basis of computation; main provisions of the two being alike in all material respects.—City of Bridgeport v. Aetna Indemnity Co., 105 A. 680.

Where a corporation breached its contract for reduction of garbage by refusing to receive further garbage, it cannot complain that a contract, made with another party and containing provisions favorable to city which its contract had not contained, was used as a basis for computing the city's damages, where bid of such subsequent contractor was made without knowledge that such provisions would be incorporated in contract.—Id.

Whether agreement under which contractor is operating in reduction of garbage for city speaks upon the subject or is silent, he is subject to reasonable regulations of health authorities.—Id.

Where corporation breached its contract for the reduction of garbage by refusing to receive further garbage, subsequent conditional offers to perform contract were ineffective to nullify breach or affect city's right of action.—Id.

### Sewer Construction Contract—Damages—Recovery—Compliance with Specifications.

(Ark.) In suit by board of commissioners of improvement district for money paid contractor under contract for construction of sewer system, and for damages for delay, chancellor held warranted in finding that sewer system had never been brought to a point where it could perform, in a substantial way, the requirements of the contract.—United States Fidelity & Guaranty Co. v. Board of Com'rs of Sewer Improvement Dist. No. 1 of Blytheville, 209 S. W. 88.

Where contract for construction of sewer system gave the right of acceptance or rejection of the work on final test, improvement district was, where there had been no substantial compliance with contract and system was rejected on final test, entitled to recover payments made, with interest from the date of each payment.—Id.

Where provision for liquidated damages for delay appeared only in specifications and not in contract for construction of sewer system, or in contractor's bond, surety on bond would not be liable for liquidated damages.—Id.

That resident engineer of improvement district of city knew that original specifications for sewer system were not being strictly complied with would not bind board of commissioners of district as a ratification of the change, where engineer was guilty of such inattention and indifference to the interests of the district, as implied bad faith.—Id.

In suit by board of commissioners of improvement district of city to recover money paid contractor under contract for construction of sewer system, held, that commissioners, because of failure to complain of the work as it progressed, were not estopped to assert that work as tendered did not conform to plans and specifications.—Id.

Improvement district held not estopped from maintaining suit for money paid contractor under contract for construction of sewer system, because of the fact that it took possession of the system and endeavored to complete it after contractor quit, in view of Kirby's Dig. § 5719, depriving commissioners of the right to excuse contractor's failure to perform.—Id.

### Power to Employ Consulting Engineer Without Bids.

(N. Y.) Under charter of city of Corning, the common council had the right in its discretion to employ an engineer to prepare plans, maps, and estimates for the building of a proposed sewage disposal works.—Vermeule v. City of Corning, 174 N. Y. S. 220.

Assuming that board of public works had no authority under charter of city of Corning to employ engineer to prepare plans, maps, and estimates for building of proposed sewage disposal works, the common council had power to adopt action of board of public works and ratify such contract of employment.—Id.

The common council of the city of Corning will be held to have adopted an unauthorized contract entered into by the board of public works, employing an engineer, where upon three different occasions it audited bills rendered by the engineer to it, and made payments on account thereof.—Id.

Under charter of city of Corning, the financial affairs of the city are committed to the jurisdiction of the common council, and the expenditures of the board of public works are limited to moneys appropriated by the common council.—Id.

Under charter of city of Corning, it was not necessary to advertise for bids before entering into contract with an engineer to prepare plans, maps, and estimates for the building of a proposed sewage disposal works; the services being of a technical nature.—Id.

### Rejection of Contract Paving by City—Good Faith.

(Kan.) Evidence held to support finding that engineer and other officers of city did not act in good faith in rejecting all of the paving done under a contract.—Frederick v. City of Bonner Springs, 178 P. 435.

Under a contract for paving a street at an agreed price per yard, contractor to replace defective portions, where the municipal authorities passing on the work refused to point out the defective portions, contractor, being prevented thereby from performing contract in full, can recover amount proportionate to the quantity of the pavement properly laid.—Id.

In an action to recover for paving done under contract with city, admission of written report of the engineer appointed by the city as to the character of the work held not error.—Id.

Answers to special findings in an action by contractor for paving city street held to mean that city did not in good faith decide that all the pavement was defective, and did not indicate the parts which it regarded as unfit, as required by the contract.—Id.

### Zoning Resolution—Power of Board of Appeals.

(N. Y. Sup.) Under Greater New York Charter, §719, subd. 5, as added by Laws 1916, c. 5503, board of appeals has no power to grant or deny an appeal, but only to reverse or affirm, or modify determination below, and make such order, requirement, decision, or determination as in its opinion ought to be made.—West Side Mortgage Co. of New York v. Leo, 174 N. Y. S. 451.

The board of appeals of city of New York had no power to make rules governing operation of building zone resolution until enactment of Laws 1917, c. 601, by which Greater New York Charter, § 242b, was amended, and had no power to make a rule requiring an appeal from a decision of superintendent of buildings in rejecting a plan for a proposed new building to be made within any certain time.—Id.

The board of appeals of city of New York is administrative rather than judicial, and rules of practice should not be rigidly applied.—Id.

# NEWS OF THE SOCIETIES

**Aug. 26-28.**—LEAGUE OF CITIES OF THE THIRD CLASS IN PENNSYLVANIA. Twentieth annual convention, Allentown, Pa. Secretary, Fred H. Gates, city clerk, Wilkes-Barre, Pa.

**Aug. 27-29.**—VIRGINIA STATE FIREMEN'S ASSOCIATION. Thirty-third annual meeting. Charlottesville, Va. Secretary, E. K. Landis.

**Sept. 30-Oct. 1-3.**—NEW ENGLAND WATERWORKS ASSOCIATION. Annual meeting. Albany, N. Y. Secretary, Tremont Temple, Boston, Mass.

**Oct. 27-30.**—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, New Orleans, La. Secretary, A. W. Hedrich, 169 Massachusetts ave., Boston, Mass.

**Nov. 12-14.**—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Springfield, Ill.

### International Association of Fire Engineers.

The forty-sixth annual convention of the International Association of Fire Engineers was held at the Baltimore Hotel, Kansas City, Mo., June 24-27, more than 450 chiefs and associate members being present.

At the opening session on Tuesday morning, President A. A. Rozetta, chief, Nashville, Tenn., presiding, city counselor E. M. Harber and chief Alex Henderson welcomed the delegates on behalf of the city. Chief Murphy, of Philadelphia, responded.

Olaf Johnson, district fire marshal, Emergency Fleet Corporation, Philadelphia, read a paper on "Fuel Oil Installation." He described approved methods of fire protection of oil tanks and lines. He illustrated his points with examples of fires in oil installations. Discussion centered on foam extinguishing.

Chief Alex Henderson's paper on "Two-Platoon Organization" was read by chief Murphy of Philadelphia. Some of the experiences with the two-platoon system were narrated and good points suggested. In the general discussion which followed great interest of the chiefs showed the question a live one. Experiences in Minneapolis, Elmira, El Paso, Trenton, Shreveport, Kansas City, Kan.; Dallas, Newark, N. J.; Colorado Springs, Lincoln and others were described.

In the evening the memorial services were held at the Elks Club, Hon. Floyd Jacobs delivering the memorial address.

On Wednesday afternoon there was a meeting at Electric Park in the form of round-table discussions. The first subject taken up was "The Adaptability of Army Gas Masks for Fire Fighting." S. H. Katz, of the Bureau of Mines, Pittsburgh, read a paper on "Industrial Use and Limitations of Respirators, Gas Masks and Oxygen Breathing Apparatus," by A. C. Fieldner, supervising chemist of the Pittsburgh Experiment Station of the Bureau of Mines. The paper pointed out the limitations of these devices and warned against their indiscriminate use in fire-fighting. Mr. Katz asked the cooperation of the chiefs in a research the bureau is undertaking on the subject of the presence of carbon monoxide at fires. The bureau will send vacuum bottles for specimens of air to any chief wishing to cooperate. There was a general discussion on the subject of gas masks followed by a statement on "Protection Afforded by Standard Army Gas Masks Against Industrial Gases" prepared by major Wilson, Research Division.

Jay W. Stephens, manager Fire Prevention Bureau of the Pacific, San Francisco, Cal., read a paper on "Fire Prevention."

W. H. Wild, marine engineering department of the General Electric Company, discussed the subject of fire-boats. The question of parking of automobiles in the business streets and especially near hydrants was discussed by a number of chiefs. "The Benefit of High Pressure Systems" was taken up. Chief Murphy, of Philadelphia, described the system in his city. "What tire is best suited for fire apparatus, solid, pneumatic or cushion?" was discussed by a number of chiefs and general opinion seemed to be against pneumatic tires until they are further developed for fire apparatus service. The value of dynamiting in case of conflagation was discussed and all expressions of opinion disapproved it. The next topic was "Relative Strength Required for Day and Night Shifts in Department Having Two Platoons." It seemed to be the consensus of opinion, although a few disagreed, that the night shift should be larger than the day. "The Fire Chief as a Factor in After-War Building Activities" was the next subject. Ex-Chief Brockwell, Durham, N. C., pointed out the duty of the chief in preventing dangerous types of construction during the present building boom. "Motor Apparatus in Cold Climates" was then taken up. The chiefs reported little difficulty with apparatus in winter except in some cases of deep snow. "Fires from Spontaneous Combustion of Coal" and the best methods of handling them was the next topic. The use of perforated pipes at different points of the pile was agreed upon as a good preventive device and also useful for extinguishing. In Milwaukee the burning coal is taken out with a clam-shell bucket and dipped in the river—and the hole filled with water.

During the day there were entertainments of various kinds and the twelve-hour pumping test was held. Capacities at 120, 200 and 250 pounds pressure were tested.

The Thursday morning session was opened with a paper on "Automatic Sprinkler Alarm Service," by F. A. Raymond, engineer, National Board of Fire Underwriters. Charles D. Pritchard, director of the department of public safety of Pittsburgh, then delivered an eloquent address in which he urged that the citizens be educated to a better understanding of the fire department and its work and an appreciation of its needs. Chief Frank Stetson, of Seattle, recounted some of the interesting events at the convention of 1888 in Kansas City, at which he presided. Charles Maulen, of the Gamewell Company, made a plea for an alarm system which would be independent of the telephones in case of strikes or fires at the exchanges.

Chief Harty presented the report of the "Committee on Co-operation of Industrial and City Fire Departments," of which chief William Bennett, of Pittsburgh, was chairman.

At noon, the city fire department presented a splendid parade of its motor apparatus, about twenty-five machines accompanied by city officials and chiefs being in line.

Matt S. Shinnick, building inspector, Kansas City, Mo., opened the afternoon session with a paper on "Building Inspection, Its Value in Fire Prevention." He urged education of the public to the need of fireproof construction. Chief O'Donnell, of Chicago, said that the chiefs should know more about the important buildings in their cities and have maps of them. Chief Kenlon also urged this and said that firemen should have a greater knowledge of architectural principles. Chief Clancy, of Milwaukee, argued against interference by politics in fire prevention work. Chief Healy, of Denver, gave some details as to the influence of architecture in fire prevention. Chief Holmes, of Sears-Roebuck, described the fire prevention methods in the company's big buildings, emphasizing the value of the sprinkler system.

The subject of storage of ammunition, high explosives and dangerous acids was then discussed. It was agreed that strict enforcement of ordinances is necessary. Ammunition was declared to be comparatively harmless.

Over five hundred delegates and visitors attended the banquet at the Hotel Baltimore in the evening. Thomas J. Higgs, former assistant attorney general of Missouri, was toastmaster. C. W. Price, general manager of the National Safety Council who was to have addressed the meeting on the subject of "Safety," was prevented from doing so by illness. Chief Kenlon, of New York, told some of the experiences of a chief in a big city.

The following officers were elected for the coming year: president, chief John Kenlon, New York City; first vice-president, chief John F. Healy, Denver, Colo.; second vice-president, chief Frank G .Reynolds, Augusta, Ga.; treasurer, chief Peter B. Carter, Camden, N. J., (relected); secretary, general fire marshal James McFall, U. S. Shipping Board, Philadelphia, (relected).

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# INDUSTRIAL NEWS

## EXPOSITION OF MUNICIPAL EQUIPMENT.

A permanent exposition covering the whole range of appliances and devices used by municipalities and occupying a floor—or perhaps two—of the Grand Central Palace in New York City is to open about October 15. The International Exposition of Municipal Equipment is to be one of the permanent expositions housed in the building by the Merchants' and Manufacturers' Exchange of New York, making it a great clearing house for American products.

The object of the exposition is to assemble in one inclusive display in a central location all the equipment involved in municipal improvements and utilities. It is expected to prove of inestimable benefit and a real economy in time and effort to city officials, chambers of commerce and others interested in the field. Instead of making expensive trips through a number of cities to study methods committees will be able to find a representative collection of the latest developments, properly exhibited and explained. It is also expected that a visit to the exposition will become a feature of all conventions of municipal and related organizations meeting in the city.

The arrangement of the exposition will be noteworthy. The displays will be logically grouped and, in addition, as far as possible, appliances will be shown in their proper relation and setting in the form of "model" utilities, fully and accurately equipped. For instance, it is expected, ultimately, to reproduce a waterworks pumping station, a power plant, a sewage disposal plant, a fire station, a garbage incinerator, a gas plant, park and playground, streets and appurtenances, and even a market, refrigerating plant and an abbattoir. These groups will be assembled under the direction of well-known authorities in their fields. The whole exposition will be in charge of Jeanne Carpenter, director. Mrs. Carpenter is well known for her work in the municipal field, and is very favorably known as the co-author of the recent book, "Municipal Housecleaning."

For the manufacturer the exposition is expected to be of vital sales benefit because of provision of permanent display, compelently attended, at a minimum overhead cost. The exposition will, of course, reach many times the number that could be reached by any branch office devoted merely to one particular line of products. It will be possible for any firm desiring to do so to maintain its New York office in connection with its exhibit. The opportunities for developing export trade through the medium of this exposition, which will attract the many foreign buyers coming to New York, are also important.

The success of the undertaking appears to be assured, since it is backed by the great resources and the responsibility of the Nemours Trading Corporation, which owns and controls the Merchants' and Manufacturers' Exchange of New York. Alfred I. du Pont is president of the corporation, which has branches in all the leading cities of the world, consisting of 19 branch offices and 3,000 foreign selling agencies. Mr. du Pont, foreseeing some time ago the possibility of making this country the center of world commerce, conceived the idea of leasing Grand Central Palace as a great trade clearing house. Eight floors will be used for permanent industrial expositions, and the four lower floors will be occupied by short-term expositions of various kinds.

Plans are well under way for the municipal exposition, and the director may be addressed at Room 421, 405 Lexington avenue, New York.

**The Sullivan Machinery Company,** Chicago, Ill, has issued for general distribution a new booklet, No. 118, describing its line of drills. These include all kinds of hammer and rock drills used in excavation and construction work, including road grading, excavating for sewers, open cut ditching, quarrying, tunneling, water main trenching, etc.

**The Texas Company,** Houston and New York, has published a handsome "story-album" entitled "Texaco — At Home and Abroad." By means of two-color drawings and interesting text, "the interest and the romance which permeates the operation of so large and successful a business as the marketing of Texaco petroleum products throughout the world" are revealed. Something of the striking growth of the company is recounted. The production, transporting, refining and distributing and informatively described and illustrated. The many uses of Texaco products and the distant countries where they become popular are the subjects of a number of attractive pages. Texaco motor oil, engine oil, Crater compound, lubricants and other products are given their share in the story.

# NEWS OF THE SOCIETIES

*Continued from page 78.*

Chief Kenlon, on assuming the presidency, delivered an address. He pointed out the great difference in practice in different cities and urged that the association study and develop standards. He said: "I have concluded to direct my every effort to start, at least, the work of establishing standards of, by and for the International Association of Fire Engineers, covering all the ramifications of organization, equipment and methods for the volunteer, part-paid and full-paid departments. Therefore, I have laid out the following program, which I propose to initiate and keep going during my term of office as president. In order that this association may justify its existence as a fire department engineering organization, it must be:

"Firstly, a technical authority establishing fire department standards, guiding the thought and methods of fire department practice;

"Secondly, it must increase, and make its influence felt by and through the medium of printed standards, through the medium of professional journals, or, in lieu thereof, through a quarterly publication devoted to influencing fire department practice, thus disseminating knowledge and compiling statistics in such form as will make them most valuable as a guide in fire department work;

"Thirdly, we must enlarge our field of influence by increasing our membership.

"To make this association the organization I believe it should be. I propose to appoint committees, which I hope will eventually become standing committees to consider the same subjects for full-paid, part-paid and volunteer departments.

"I propose to appoint the following committees. At this time, however, I shall only name the chairman of each committee:

1. Organization and Supervision—John F. Healy, Denver, Colorado.
2. Appointments, Promotions, Retirements and Pensions—Joseph Crawley, New York.
3. Organization and Strength of Companies:
    - Full paid—William H. Murphy, Philadelphia.
    - Part Paid—
    - Volunteer—
4. Fire Department Engineering — to include apparatus, hose and minor equipment—Howard Stanton, Norwich.
5. Location, Design and Construction of Apparatus Houses—Frank Reynolds, Augusta.
6. Drill Schools, Drills and Training—John C. Moran, Hartford.
7. Rules, Regulations and Discipline—Charles Ringer, Minn.
8. Fire Fighting, Fire Prevention and Fire Manual—Thomas Dougherty, New York.
9. Assignments and Response to Alarms — August Gerstung, Elizabeth, N. J.
10. Building Inspection by Members of Fire Departments—John J. Conway, Cincinnati.
11. Organization and Operation of Private Fire Brigades—Philip Harty, Youngstown, Ohio.
12. Reports, Records and Statistics—Olaf Johnson, Superior, Wis.
13. Co-operation and Active Assistance between Fire Departments—George L. Johnson, Waltham, Mass.
14. Water Supply, High Pressure System—August Emrich, Baltimore.
15. Municipal Water Supply—Charles Fischer, Newark, N. J.
16. Membership—Hugo Delfs, Lansing, Mich.
17. Publications—James McFall, Philadelphia, Pa.
18. Salvage—James O. Schwenck, New York.
19. Co-operation with the Bureau of Standards, Washington, D. C., and Kindred Organizations—Sherwood Brockwell. Raleigh, N. C.

Chief Kenlon also suggested that the standards might be published through the medium of a journal of the association and he appointed a committee to take up this matter. He said that the goal of the organization should be 5,000 members before the next convention. He said that this is possible because there are in this country and Canada about 248 full-paid fire departments, 1,761 part-paid and 7,000 volunteer departments—as well as hundreds of private departments for railroads and industrial plants.

The convention closed with a smoker at the Kansas City Athletic Club.

**American Road Builders' Association.**

The seventeenth annual convention of the American Road Builders' Association will be held at Louisville, Ky., on Feb. 9, 10, 11, 12 and 13, 1920.

In connection with this meeting of the association which will be the Tenth American Good Roads Congress under the auspices of the A. R. B. A., there will also be held the Eleventh National Good Roads Show. At the 1918 and 1919 meetings, the show feature of the congress was confined to small exhibits that could be accommodated in the hotels in which the meetings were held. The conditions which led to the adoption of this plan no longer existing, it is proposed to make the 1920 show similar to the complete exhibits that were held previous to 1918. Moreover, because of the reawakened interest in road building and the enormous expenditures which are going to be made in the next few years, the officials of the association expect to get together an exhibition that will surpass even those of former years.

The decision to accept the invitation extended by the city of Louisville, was reached at a meeting of the board of directors at which invitations from many other cities were considered.

Both the sessions of the convention and the exhibition will be accomplished in the First Regiment Armory. About 53,000 sq. ft. of floor space will be available and plans of the exhibition hall will be prepared and issued in the near future. As the armory is situated within two or three blocks of the leading hotels of the city, the officials of the association feel that the facilities for the meeting are very nearly ideal.

The program, as in years past, will cover every phase of highway construction and maintenance and various related subjects. The prepared papers and the discussions will deal with highway problems from the points of view of road and street officials, highway engineers, directors, and all of the various classes actively engaged in highway work.

## PERSONALS

Tucker, Capt. Harry, Engineers, U. S. A,. who recently returned from France and received his discharge, has been appointed associate professor of highway engineering, State College of North Carolina. He also becomes acting head of the new department of highway engineering, which has just been created as a subdivision of the civil engineering department.

Edwards, Llewellyn N., supervising engineer of bridges, Department of Works, Toronto, Ont., has resigned to become senior highway bridge engineer, United States Bureau of Public Roads, Washington, D. C. He was graduated from the University of Maine in 1908 and has since engaged in bridge-engineering work. Before he joined the engineering staff of the city of Toronto in 1913, he was connected with a number of railroads.

McGibbon, William, previously the State Highway Commissioner of Iowa, has been appointed county engineer with headquarters at Knoxville, Iowa, succeeding W. O. Price, who has been appointed district engineer, with headquarters at Chariton.

Von Zuben, F. J., city engineer of Fort Worth, Texas, since 1905, has resigned to enter private business.

Lewis, D. L., formerly building inspector of Fort Worth, Texas, has been elected city engineer to succeed F. J. Von Zuben.

McKeel, Alfred, has resigned his position as assistant engineer to the North Dakota State Highway Commission to become highway engineer under F. O. Lang, county engineer of Polk County, at Des Moines, Iowa.

Lemon, Charles S., a division engineer of the Pennsylvania State Highway Department, is now engineer for the Bureau of Township Highways.

Moffitt, H. R., formerly assistant engineer of the Pensylvania State Highway Department, has been appointed to succeed Charles S. Lemon as engineer of the Blair-Cambria-Somerset-Bedford district.

Worcester, Lieut. Robert J. H., having received his discharge from the army, has returned to his former position as engineer and superintendent of roads and bridges for the town of Concord, Mass.

White, C. J., formerly resident engineer for Northern Pacific .Ry., has resigned to become assistant highway engineer, State Highway Department of Minnesota, with headquarters at Pine river.

Frickstad, Walter N., engineer's office, Oakland, Calif., has been appointed a senior highway engineer, United States Bureau of Public Roads, with headquarters at Odgen, Utah.

Healey, Lieut. Gerald F., U. S. N., who was previously in the employ of the New York State Highway Department, has received his discharge from the service and has entered the Bureau of Public Roads, Washington, D. C.

## PROBLEMS CITIES ARE STUDYING
### WITH EXPERTS

Akron, O. is to build a SEWERAGE DISPOSAL PLANT, for which plans are being prepared by the Osborne Engineering Co., consulting engineers.

Salem, N. J., is to make PAVING IMPROVEMENTS, for which bids have been advertised, according to plans prepared by the consulting engineers, Keasby & Sparks.

Surveys are being made by the consulting engineers, Bryant & Huffman, for three state HIGHWAYS crossing Denton county, Denton, Tex. Construction work will begin within the next few months.

Longview, Tex. is contemplating extensive PAVING, WATERWORKS, and SEWERAGE improvements and H. U. Roberts, civil and sanitary engineer, has been retained as consulting engineer.

SEWERAGE IMPROVEMENTS are to made by Stratford, Conn., including the completion of the sewage disposal plant, chlorine treatment house and sludge beds, etc. The plans were prepared by the consulting engineer, Clyde Potts.

SEWERAGE IMPROVEMENTS are to be made by the village of Bradley, Ill. The work involves the construction of 40,000 feet of vitrified tile pipe and brick sewers ranging in size from 10 to 48 inches. The consulting engineers are Marr, Green & Co.

PAVING IMPROVEMENTS are to be made by the village of Litchfield, Minn. The consulting engineer is J. P. Wolff.

Milan, Mo., is to make SEWAGE IMPROVEMENTS, involving sanitary sewer and sewage disposal plant. The consulting engineers are Archer & Stevens.

Thomas co., Thomasville, Ga., has advertised for the construction of a BRIDGE over the Ochlochnee River. The plans were prepared by the consulting engineering firm of J. B. McCrary Co.

Cass county commissioners, Linden, Tex., plan ROAD IMPROVEMENTS, involving 13.23 miles of highway from Queens City to Sulphur river, to cost $75,000. The consulting engineers are Hess & Skinner.

PAVING IMPROVEMENTS are to be made by the city of Lansing, Ia., involving bituminous macadam pavement and combined curb and gutter. Plans were prepared by the consulting engineers, M. Tschirgi & Sons.

Ashland, O., has advertised for bids for WATERWORKS IMPROVEMENTS to include a filtration plant of 1,500,000 gallons capacity and an auxiliary pump station, pipe lines and a storage reservoir. The plans were prepared by the consulting engineer, R. Winthrop Pratt.

# Municipal Journal & Public Works.

City County State

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## USING CONVICTS FOR ROAD CONSTRUCTION.

The increasing use of convicts in road work, both state and county, and the general approval and satisfactoriness of such use, were shown by the symposium on the subject in last week's issue. In every case the road officials had concluded that good results as to construction could be obtained with a saving in cost; while the benefit to the convicts themselves is generally conceded.

In some respects the opinions differed, however. Utah's highway engineer says the men must be kept in a compact organization to prevent escapes, while in Wyoming the men were sent to points thirty miles away without guards; and the efficiency of two Rhode Island gangs varied considerably. Probably the opinion of state engineer B. M. Atwood of Arizona furnishes the explanation for different experiences—that good work and freedoom from escapes is dependent upon the leadership or management. In Rhode Island the difference in these respects was attributed to this and also to the food and housing furnished. It would seem probable that the temperament that leads many men to yield to an impulse to break the law would also make them more susceptible to the character of the treatment they receive.

The opinion of Mr. Patterson that the best results are secured by using middle aged convicts, because they are more reconciled to their imprisonment than the younger ones, is interesting; as is that of many of those whose opinions are quoted, that it is advisable to give money, reduction of sentence or better food to those who serve faithfully in the road work.

## TYPHOID FROM POLLUTED STREAMS.

Oklahoma City discharges its sewage into the North Canadian river, and the State Health Department calls attention to the fact that all the deaths from typhoid fever in Oklahoma county last year were along this river and that farmers and townspeople along the river below the city are suing it for $125,000 damages. The inference would seem to be that Oklahoma City is morally responsible for all the typhoid death in the county, and may be held legally responsible for pollution of the stream.

But is this quite fair? Do none of these suing towns and farmers discharge any pollution of their own into the river? And should they not be charged with "contributory negligence" in using unpurified water from the river for drinking purposes? Every stream that flows through an inhabited area is more or less contaminated, and every one knows or should know that he runs a risk in drinking water from such a stream before it has been filtered or sterilized. Oklahoma City probably should treat its sewage to prevent undue pollution of the river, but few hold today that a city is either legally or morally obligated to eliminate all germs from its sewage before discharging it into a stream or lake; such purification, while not impossible, would be impracticable.

Cities should treat their sewage to a degree that is reasonable, considering the size of stream receiving it and other conditions. But cities or individuals must purify the water of a stream if they wish to drink it with safety; if they fail to do so they are themselves largely to blame for any injurious results.

## HYDRANT RENTALS.

In this issue, in connection with the table on "Meter Rates and Fire Protection," is given a brief discussion of the rates paid to private companies and municipal departments for fire protection, generally in the form of hydrant rental. There is a continually recurring interest in this subject among officials of cities served by private water companies; while an ever-increasing number of water departments receive, as cash or credit, an allowance from the city for fire protection afforded by the municipal plants.

The very wide range in hydrant rates paid in different cities is probably due to the failure, until within the past five or ten years, to recognize the existence of any logical basis for such payments. Private companies got whatever they could for fire hydrants, while probably the majority of municipal departments based their charges upon the precedent offered by the private companies. If the payment made for each hydrant were simply sufficient to cover the interest and the depreciation on its cost plus the cost of keeping the hydrant in repair, the amounts paid would be very small. It seems always to have been recognized, however, that the payment for the hydrant was not for the hydrant alone but for the service rendered by means of it.

This subject of hydrant rental has already been discussed in Municipal Journal several times and it seems to us that the theory advocated by engineers and committees of the water works associations, that the payment for fire protection should be based upon the total cost to the company or department for furnishing such protection in addition to what the cost would be for furnishing water for consumption only, is the only logical one.

This is practically the basis of payment in several cities referred to in this issue which pay, for fire protection, a certain amount per mile or per thousand feet of main. A few cities apparently base the payment on the value of the protection to the community, either as a certain rate on the assessed valuation of the property protected, or as a fixed amount per capita of the population in the protected district. There is something to be said in favor of the latter ideas, but present tendencies in all public utilities seem to be toward basing payment on cost of service to producer rather than on its value to the parties served.

# SOME LESSONS FROM FRENCH ROADS

### These Macadam Roads Carried the Heaviest Traffic Known — Bituminous Treatment Proved Beneficial— Over Eight Hundred Million Dollars' Worth of Macadam and Gravel Should Be Improved, Not Destroyed.

By MAJOR E. A. KINGSLEY.*

France covers an area of some 207,054 square miles. Texas spreads out over 262,398 square miles. The five central states, Ohio, Indiana, Illinois, Wisconsin and Michigan cover 251,864 square miles. This comparison will give one the relative size of the sister republic of Europe.

Prior to America's entry into the great war, a small section of territory in the extreme northern part of France had been given over to army movements. The battle fronts and battle grounds lay between the Vosges mountains and the north coast line. North of a line drawn east from the Bay of St. Michel to the north point of the Franco-Swiss border, practically all of the intensive training and warfare of the French, English and Belgian armies was conducted.

This north section of France covers less than one-third the total area of the country. The balance of the country to the south saw but little of the real war activities. True, there were many permanent camps in which soldiers were concentrated and trained. And many temporary camps were built in various sections of the south. Used as concentration and training centers, these camps were busy ones but their activities were each confined to a limited area.

After the United States had declared war against the Hun, preparations were immediately made by the American Army staff for "America's invasion of France." The entire south section of the country was given over. Many of the permanent camps were evacuated by the French and taken over by the Americans. Towns, cities and communities were turned over to the American Army and hundreds of new camps, new temporary hospitals and various other industries necessary to an immense army were planned and construction was begun.

The base ports, Le Havre, Bordeaux and Marseille were given over in part to American shipping. Brest and St. Nazaire were practically given over to the Americans. As the fighting line was north and east of Paris, American troops and supplies had to be transported entirely across France. St. Nazaire became the principal base port, with Bordeaux a close second.

Early in 1918 the time-honored division of the army known as "Line of Communication" was reorganized and expanded into the "S. O. S."—the Service of Supply. This, as the name would indicate, covered every branch of service necessary for supplying the needs of the army at the front. It became immediately one of the most important sections of the army. It established warehouses, built factories and repair shops, operated railroads, took over motor transportation, and in fact conducted every branch of industry necessary to feed, clothe and arm the real soldiers at the front. The S. O. S. was the business end of the army.

### FRENCH ROADS FOR AMERICAN TRAFFIC.

All supplies had to be transported from the base ports in the west to the armies in the east, and in addition to several double-track lines of railroad, the S. O. S. was compelled to augment its lines or ways of communication between these with motor transportation. This would not have been feasible but for the splendid system of French highways and their excellent condition.

A great distributing depot had been established at Is-sur-Tille in eastern France, as near the front lines as possible and about 450 miles from the ports at St. Nazaire. From this depot supplies and equipment were rushed directly forward to the fighting forces. Necessarily, then, Is-sur-Tille must be kept well stocked and the problem became very largely one of transportation. Railroads were early taxed to their limit and thousands of trucks and automobiles were then called into service and the world renowned highways of France became great arteries of traffic over which American army supplies were rushed forward by the Americans to the Americans.

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* Superintendent of Roads, Intermediate Section, A. E. F., France.

Near the centre of France is the ancient city of Bourges, and at this city the roads from ports Bordeaux, St. Nazaire and Brest met, and from Bourges east a continuous line of laden trucks moved towards the front, all of the American supplies being carried over this one route.

From Bourges through Nevers to Decize (about 60 miles), this enormous, continuous traffic was over National roads. From Decize to Luzy, a distance of about 25 miles, the route was via a departmental route. From Luzy to Is-sur-Tille the roads were entirely National.

These lines of S. O. S. communication were called upon to sustain perhaps as severe traffic as ever a road is required to care for. It is true that the intensive traffic just behind the battle lines was far more severe than the S. O. S. traffic, but nothing in peace times ever approaches even approximately any such traffic. Consequently it is from experiences on the lines of communication that lessons beneficial to America's road problem must be learned. Traffic on these roads more nearly approached the heaviest traffic on the main highways of the United States, present and future.

### MACADAM GAVE GOOD SERVICE.

Volumes have been written of the wonderful French roads, but too much has not been said. And yet these roads, like the roads at the front, were just plain waterbound macadam. But they stood the test. Nothing other than macadam, and very quickly built macadam, could have been used at the front. One "expert" writing from Washington in the summer of 1917 told us that "Belgian Blocks or Portland cement concrete were the only roads which could be satisfactorily used." This gentleman afterwards came to France but he was not sent to any advanced-section road work.

Two or three reasons may be ascribed for the amount of macadam roads in France. In the first place, nearly all of the country is underlain with rock, much of it being a fairly good quality of lime rock. The climate, too, being damp, is favorable for water-bound macadam. Perhaps the most valid reason, however, is the abundant labor prevalent at so little cost. Labor has been the cheapest commodity in France. Maintenance was continuous and, with the cheap labor, waterbound macadam roads filled the bill.

### BITUMINOUS ROADS IN FRANCE.

Near some of the larger cities considerable stone block pavement has been laid and prior to 1914 quite a little tar had been used for penetration work. During the war, little if any block pavement was laid and only a small amount of tar was used. But such stretches of treated road as there were, even with but little maintenance, proved the efficacy of bituminous treatment, and the French highway engineers are exceedingly strong advocates of such treatments. Where the old macadam had been well treated, the roads stood the new intensive war traffic wonderfully. The writer succeeded in obtaining from this country a few barrels of bituminous material for use on his section of this work, and when this fact became known to the French engineers they were greatly elated and constantly importuned him for more of such material.

Now from "Sunny France," (the country of perpetual rains) the army of 2,000,000 men has returned. This army has seen the wonderful roads of France and discovered first-hand what roads mean to a community. A full 2,000,000 is thus added to the active "road boosters" of the United States. A very large percentage of these millions of voters and tax-payers have often traveled over these roads and have seen the character and worth of them, and they will ask why we in America can not have thousands and thousands of miles of the same kind of roads.

### NO "BEST ROAD" FOR ALL THE UNITED STATES.

But should we in the United States have the same kind, or some other? The Paving Brick Association will tell you that brick is the only satisfactory and absolutely perfect road material. The Cement Association, anxious to see the output of the cement mills increased, will send its representative any where at any time to tell you his story and assure you that Portland cement alone can give you the road required. In Boston you are taught that Warrenite makes the perfect road; in New York you learn that Bito-slag is really the material that you wanted, but in Philadelphia you find out you had been led astray as Trinidad asphalt in some form should have been used. Down in Arkansas you find that you are all wrong, for macadam roads are the thing, while the thousands of miles of Texas gravel roads convince you that old mother earth has a supply of the right material for you in many localities. Then after a ride around Bexar county you are sure that Texas rock asphalt is the real spring tonic for your weakened road conditions.

None of these will solve the problem for all localities. It is a problem that must be solved by the engineers (not by politicians and promoters) after due investigation as to climate, traffic, local material, finances and a myriad of other important things. The writer has no quarrel to pick with promoters. They are essential in road work and the hosts of honest ones (there are many, really) are valuable to the engineer and the community. Perhaps no one man has done more in the cause of good pavements and material than Will P. Blair of the Paving Brick Association. So, too, has the Cement Association been of wonderful benefit to the engineers in aiding them to obtain a correct knowledge of their materials and the uses of them. The asphalt people, the bitulithic organizations, and others engaged in legitimate promotion are very valuable aids. But it is for the engineer to discriminate between legitimate, educational promotion on the one hand, and promotion for sales only and a "public be dammed" policy on the other.

This distinction must always be borne in mind if the road problem is to be solved successfully. Portland cement concrete will not make a very digestible Christmas fruit cake (as some cement promoters seem to want us to believe), nor will vitrified pavers, rattling 10 or 12 in the "N. P. B. M. A. standard rattler with standard shot," make a very successful feather bed. Neither will "Aztec" or "Texaco" used as a light surface treatment over trap rock waterbound macadam make as durable a pavement as is required on lower Broadway, nor cement-grouted granite blocks be just the thing to use on a country road out in central Iowa.

As for a "permanent" road, it is safe to say that no such road exists. We can only approach as nearly as is possible, all things considered, to the permanent. Perhaps the term might be applied to roads built to sustain the traffic of the community at an expense which that traffic justifies, considering the material costs, wealth of the community and traffic requirements. The engineer, if a competent man, can advise his people on all these conditions. Some roads will demand, under this formula, brick or cement or asphalt or some other of the surfacing classed as "permanent pavements." Some will come under as macadam, waterbound or treated, and miles of other roads will be built of gravel.

### SAVE THE MACADAM ROADS.

The rapid increase in automobile and auto-truck traffic on the through roads in the more settled communitites has relegated waterbound macadam and plain gravel roads generally to a light-traffic class. But to say that this class of road is a thing of the past ages and a waste of money is as foolish a statement as it will be for our returning thousands to advocate the general adoption of waterbound macadam for all roads because of our experiences in France. Neither course would be an intelligent one.

In the United States it is estimated that up to January 1, 1919, there were 70,000 miles of waterbound macadam and 130,000 miles of gravel roads. Some 200,000 miles of real road, built of local material! Certainly the macadam has cost not less than $6,000 per mile to build. And the gravel has probably cost half as much or $3,000 per mile. At these rates $420,000,000 has been spent for macadam and $390,000,000 for gravel. A total of more than $800,000,000 has thus been spent for the less permanent type of road. One of the first problems is how to save this expenditure, for most of these earlier built roads are the main highways. Millions of dollars has also been added to this original $800,000,000 for maintenance. Many of the gravel and macadam roads are now very old and have been constantly used for years, some for generations. Shall these be thrown away by digging up and replacing with what is know as a "hard surface road?" Experience has shown that these roads can be treated at comparatively small expense per annum and actually made permanent roads so far as permanence goes in road building.

The cost of tearing up and replacing these macadam roads with any new pavement would certainly, at present prices, not be less than $35,000 per mile for an 18 ft. metal surface. Treatments such as have been so successfully used in many parts of the country for the past few years have proven the advisability of saving what has already been spent. With the highest quality of bituminous binder, certainly the best kind of surface treatment can be applied for not to exceed $5,000 per mile, while subsequent treatments would not, for maintenance purposes, reach $1,000 per mile per annum.

The difference in first costs would be say $30,000. Interest at 4 per cent on $30,000 (not allowing for any sinking fund) would be $1,200. It is therefore safe to guarantee that for less than the annual interest on the mere difference in first costs between the heavier so-called permanent surfaces and a good penetration surface treatment, the great majority of all gravel and macadam roads now built can be surfaced and maintained.

No fault is to be found with the so-called permanent pavements mentioned and many others, as they are excellent pavements when well built. But there are times and occasions when the community cannot afford to consider them. And many thousands of miles of our old gravel and macadam roads are included in those which should be maintained at far less a cost than such an expensive rebuilding would entail on the community. Great caution, however, must be used in determining which conditions will warrant the greater expense and which will permit of the lighter expense. The asphalt salesman or the cement salesman is not the ideal man to advise the community on this point. Nor is the contractor who has submitted a low bid on concrete, on brick or on sheet asphalt or the firm who wants to surface with a light treatment. Equally poor an advisor is the property owner who has allowed his opinions of the various pavements to be formed by paving promoters. The State Highway Departments all should have engineers of character, reputation and experience, and the better class of experienced local engineers and the really experienced county engineers are men equipped to advise on these matters and they should be listened to as they give their "reasons why."

There is no suggestion, in France, of replacing their splendid macadam roads with expensive pavements. Much bituminous surfacing has already been done. After peace conditions, much more will be done. Even now the engineers are planning for such work. But they will continue to build macadam roads in France just as we will so continue in America. Waterbound macadam and gravel roads will continue to be built and continue to be used. There are thousands of miles where no higher type of road is necessary or may ever be necessary. So, too, there are thousands of miles where brick surfaces are needed and will be built; millions of barrels of cement will be needed for good concrete roads; hundreds of thousands of tons of asphalt will in the next few years be made up into the various asphaltic surfaces. All these are good and are badly needed. But it should be borne in mind that millions upon millions of dollars can be saved to the already heavily taxed property owner by preserving the old macadam and gravel by intelligent treatment. And to say that all improved roads of the future must be of one kind costing $30,000 to $50,000 per mile shows a deranged mind, to say the least.

There is no question but that thousands of miles of gravel and macadam must be taken care of. Intensive automobile traffic is too much for untreated roads of this character. But the engineer owes it to his community to give it the best possible results with a minimum expenditure looking toward permanency. France is a frugal nation. She has built macadam because she needed roads, because rock was plentiful and because they were the cheapest first-class roads at the time which entirely filled the bill for the French. But auto traffic has changed conditions and France is now confronted with the necessity of changing her methods of construction on the heavy traffic highways. Her engineers are studying the questions and adopting new methods. But these engineers contemplate using for the maximum advantage to France the macadam roads already so well built and so beneficial. America is not different from France except that we think less of the original cost of what is to be torn up. We often overlook the advantage to be gained in utilization rather than destruction. This has reached the point where the destruction has become wanton waste. Eight hundred millions of dollars is a big sum of money to dig up and throw away when there is a satisfactory way of utilizing the largest part of the expended millions. Then, too, millions of dollars will annually continue to be spent, and rightly spent, in building macadam roads. And even though waterbound macadam is sufficient for all purposes now, in a few years increasing traffic may require a more permanent surface. Then the macadam may be built upon, not thrown away. Macadam, waterbound, is not the ideal pavement but it will continue to be used because it is cheap; because it can be easily and quickly built and because in many instances it answers every purpose.

So, sane and sensible engineers, let us use modern methods and build good macadam roads, waterbound or bituminous bound, where these roads will answer every purpose. Where traffic requires a better and more expensive road, let us figure costs "and everything" and build accordingly. And instead of throwing away the value of the money already spent, let us utilize as foundations the macadam and gravel we already have. Upon such foundation can be built the character of road necessary to sustain the new traffic. The permanent road has not yet been found. In a few years more we may be called upon to tear up again the "permanent" roads we are building today. We have had to learn from the Frenchmen what are actual road systems and what they mean to a country in peace and in war. And we have learned that well built waterbound macadam and gravel roads may be depended upon, if cared for, to sustain even the most intense traffic for long periods. But with our modern machinery and equipment and our excellent bituminous cements, we have nothing to learn from them as to methods of treatment and preservation. STOP, LOOK, LISTEN! Then use common sense, good judgment and engineering knowledge and experience, either your own or your fellow engineer's

# STATION FOR DISPOSING OF NIGHT SOIL

### Latest Practice of Public Health Service as Employed at Montgomery—Method and Cost of Operating Station.

While a sewerage system—water-carriage—is unquestionably the most sanitary and least objectionable way so far devised for removing human excrement from dwellings, there are always some buildings on the outskirts of cities which are not yet served by sewers; and there are in many cities quite thickly populated sections which are not sewered, though, of course, they should be.

Consideration of the health of the citizens demands that as sanitary a substitute for sewerage as is practicable be operated until the sewers are provided. It seems to be generally agreed that the can system, properly operated, is the best of such substitutes. The proper operation includes disposal as well as collection. How one such system was carried out was described in our issue of April 26, 1919.

A station for disposing of can-collected excrement at Montgomery, Ala., designed by E. B. Johnson, chief sanitary inspector of the U. S. Public Health Service at that city, represents the latest practice of that bureau.

First of importance comes the location of the station, for there will be some objectionable odors which will certainly become a source of complaint on the part of persons residing in the vicinity.

Of equal importance is the proper equipment and management. If the building and the persons of the attendants are not kept clean, it will be difficult to retain the necessary operators.

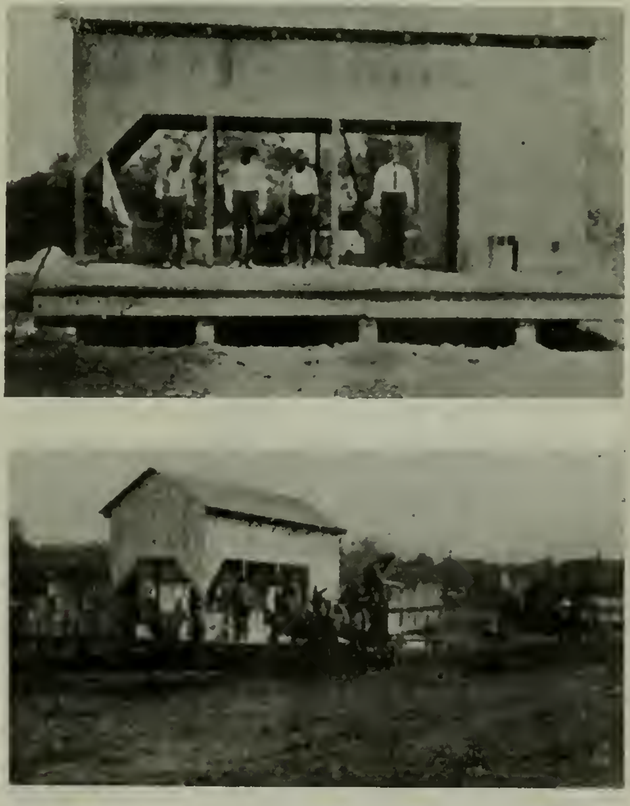
At Montgomery, a plot of ground 150 feet by 100 feet, located on a bluff overlooking the Alabama river, was selected. The nearest dwellings are approximately 300 feet distant, and there are not more than 20 houses within 700 feet of the station. There are, however, 3,300 privies, in which 3,900 cans are used, within a radius of a mile and a half. By locating the disposal station in the center of the available plot, free ventilation has been secured and a reasonable zone maintained between it and adjoining property.

The chief consideration determining the size of the station was the platform room necessary to accommodate the incoming cans. It was estimated that 4,200 weekly (or 700 daily) would be brought through this station, and the assumption was made that not over 200 of these would arrive at one time. To allow for subsequent expansion of the system, however, all further estimates were based on a possibility of 480 arriving at one time; so that the station has really a potential capacity of over 10,000 weekly. Since the cans are changed once a week, the station could dispose of the excreta from a territory containing 10,000 cans, or could serve a number of houses approximately two and one-half times that in the present allotted territory.

In order to provide space for the 480 cans which might possibly be unloaded at one time, it was decided to build an unloading platform 30 feet by 7 feet, and on the opposite side of the station a loading platform of the same size. Each of these platforms was designed to hold 480 cans in stacks four tiers high. To provide sufficient room in which to work around the hoppers, a space 6 feet wide, running the entire length of the building, was allowed for them between the two platforms. Thus the entire station, when completed, was 30 feet long by 20 feet wide. The cut on page 86 shows a floor plan of the station and an end elevation.

The station was built on brick pillars which were placed 5 feet apart and which were of sufficient height to bring the floor from 2½ to 3 feet higher than the driveway. This permits the easy handling of the cans between the wagons and the platforms. The stringers were 4-inch by 6-inch timbers, and the flooring was made of 2-inch boards. The building proper is 12 feet high at the ridge and 9 feet at the eaves. Corrugated galvanized sheeting was used.

As originally designed, only the central portion of the station, 6 feet in width, was covered by a roof. In building, this plan was adhered to for the purpose of obtaining thorough ventilation and ample light. Experience has shown, however, that a better plan would be to extend the roof over the entire platform and inclose the sides with sliding or rolling doors. The attendants need shelter in stormy weather and the station equipment should be protected against theft and depredation. Also, it is proposed in future stations to provide a concrete floor with a center drain. A roadbed of cinders was laid from the street to and around the station.



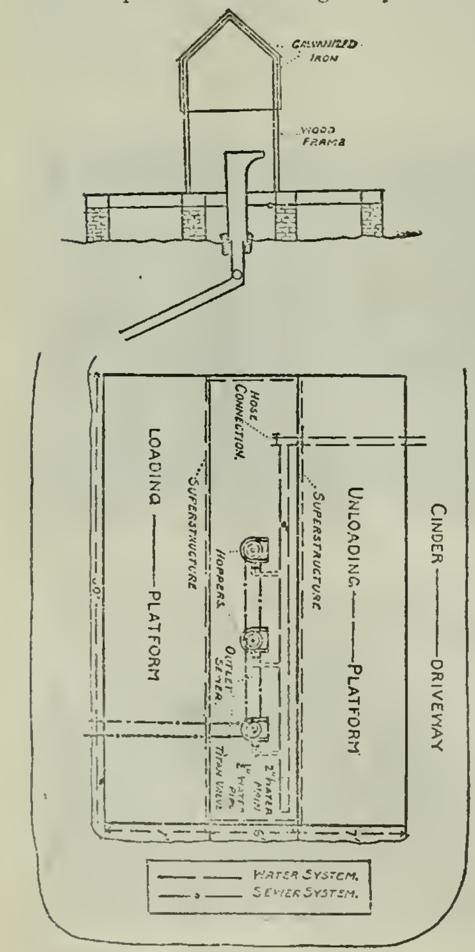
TWO VIEWS OF BUILDING FOR DISPOSING OF NIGHT SOIL

The most important and interesting feature of this station is the means by which the excrement is removed from the cans. Three concrete hoppers are used, each of which has the shape of an inverted frustum of a cone with a lip extending 12 inches toward the unloading platform. The lip is U-shaped and the lowest part of the inside is about 7 inches below the top of the hopper. On the inner wall of the hopper, and level with the inside bottom of the lip just described, 4 pieces of right-angle iron are placed at equidistant points. One side of each angle iron is fastened to the inner concrete wall by bolts, while the other side projects 3 inches into the interior of the hopper, thus forming projections which support an inverted can. The diameter of the hopper at this point is 17 inches, while the can is 15 inches diameter at the top. The concrete hopper narrows down gradually until it connects with an 8-inch sewer, which discharges directly into the Alabama river.

For washing the cans, a half-inch pipe projects into the hopper and rises vertically to a point 2 inches above the angle-iron supports. The flow from this pipe is controlled by a titan valve located just outside the hopper. Ordinarily this valve is kept closed by a spring, but is opened by moving a lever and is kept open during the operation of washing either by foot pressure of the operator or by a weight placed on the lever. The washing pipe is connected to a 2-inch pipe fed by the city mains.

### OPERATION OF STATIONS.

On bringing a load of used cans to the disposal station, each wagon is driven alongside the unloading platform, where the work of unloading is performed by the driver of the wagon and his two helpers. After the cans have been unloaded, the wagon is driven around to the opposite or loading platform, where the same number of clean cans are placed on the wagon by the same employes.



PLAN AND SECTION OF BUILDING.

TWO VIEWS OF HOPPER.

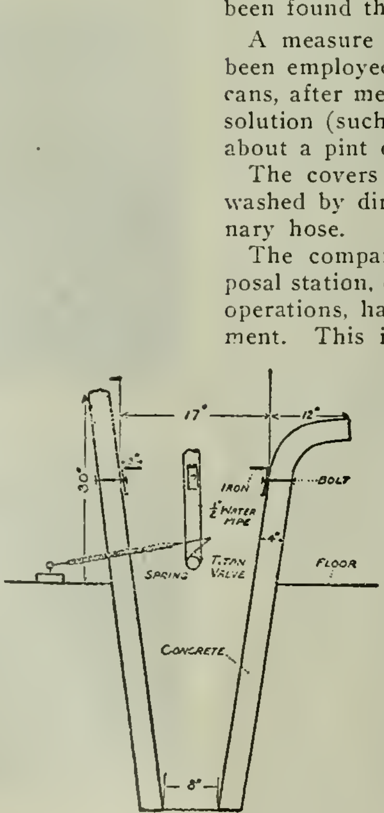
The actual handling and cleaning of the cans at the hoppers is performed by two station employes who operate under the direction of a foreman. One man operates on the "soiled can" side placing the cans in the hoppers, while the other, operating on the opposite side, removes and places them on the "clean can" platform. The man handling the soiled cans loosens the lid, which is dropped onto the platform topside down, and lifts the can to the lip of the hopper. It is then quickly inverted over the washing pipe and the greater portion of the contents falls into the hopper. The can now being in position for washing, the valve is opened and the half-inch stream of water turned on. The water is allowed to flow for from 40 to 60 seconds, after which time it is shut off by the operator on the loading side and the can removed. In practically every instance a single operation cleans the cans satisfactorily, since only in about 1 per cent of the cases do feces adhere to the inner surface after the washing. In such cases this material is loosened by applying a solution of lye by means of a mop. Despite certain apprehensions regarding the possible deleterious action of the lye upon the galvanized surfaces it has been found that no damage has resulted.

A measure not in use at this station, but which has been employed quite generally, is that of immersing the cans, after mechanical cleaning, in a tank of disinfectant solution (such as 1-50 compound cresol solution) leaving about a pint of the solution in the can.

The covers previously upturned on the platform are washed by directing upon them a stream from an ordinary hose.

The comparatively slight odor prevailing at the disposal station, even during the unloading and the cleaning operations, has been a matter for much favorable comment. This is due to the fact that all dirty cans are kept tightly covered until they are ready to be placed into the washing hopper. Then, too, the rapidity with which they are handled and the thoroughness of the washing contribute to this favorable result. The process is greatly simplified by the fact that the outer surfaces of the cans seldom become soiled.

The disposal station was erected during the war, at a time when the cost of labor and materials was unusually high. Even so, it does not appear that the expense of construction and maintenance has been disproportionate to the success which has attended the project. The items of expense connected with the erection and operation of the main disposal station may be briefly summarized as follows:



SECTION OF HOPPER.

| | |
|---|---|
| Cost of construction: | |
| Ground | $1,500.00 |
| Station and hoppers | 768.40 |
| Sewer, water pipes, and fixtures | 931.60 |
| Total | 3,200.00 |
| Cost of operation (daily): | |
| Foreman | 4.50 |
| 2 laborers, at $2.50 | 5.00 |
| Total | $9.50 |

This force handles 700 cans daily, and it could, if necessary, care for 1,200 cans in the same time.

The disposal station has been in continuous operation in Montgomery for more than six months. In that time a large number of service cans have been cleaned expeditiously and with practically no objection from persons either working at the station or residing in the neighborhood. From a mechanical as well as from a sanitary standpoint, in which it is an important factor in the prevention of disease, the station has come to be regarded by the community as a successful part of an important system.

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## ST. PAUL'S STREET CLEANING AND WASTE DISPOSAL.

### Increase in Costs Last Year Over Those of the Year Before.

The work of the Bureau of Sanitation of the Department of Public Works of St. Paul during the year 1918 was quite similar in most respects to that during the year 1917 (which was described in our issue of September 28, 1918) except for the costs and prices, and it is interesting to compare these for the two years.

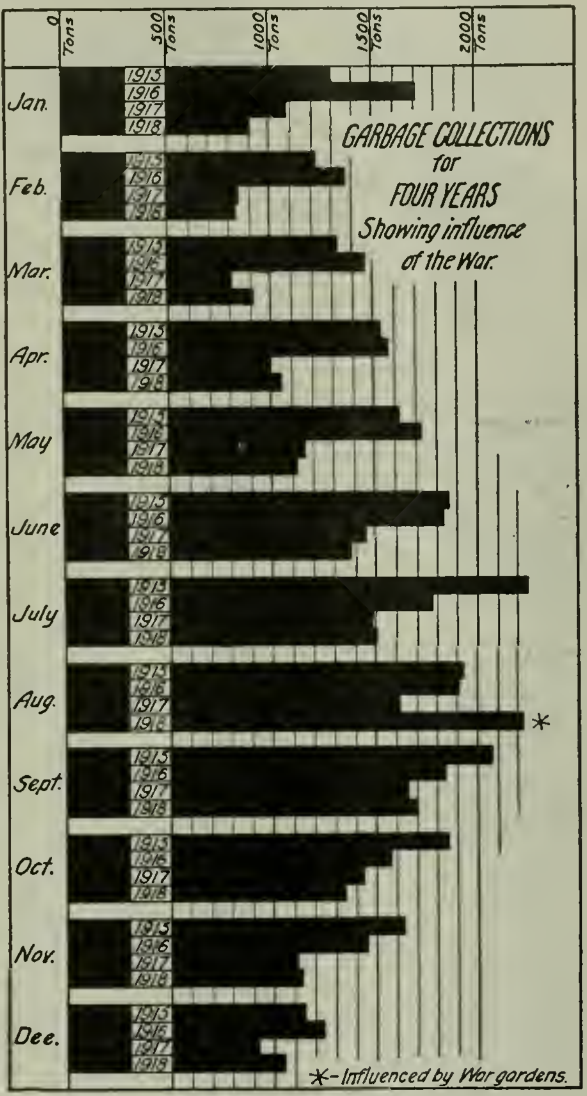
The salary of the inspector of street cleaning, who has charge of this work, has been raised from $100 a month to $115. Teams were paid 75 cents per hour instead of 66 2-3 cents, and shovelers received 27 cents instead of 25 cents.

The streets in the business section continued to be flushed by three horse-drawn flushers, the cost of operating each flusher for one night being given as $12.07 in 1917 and $11.52 in 1918, and the cost per thousand square yards having averaged 24.7 cents in 1917 and 23.6 cents in 1918, this including in both cases the pay-roll, oil, waste, gasoline and water, and in 1917 the repairs to equipment, but not including such repairs in 1918, this probably accounting for the lower cost in 1918.

In 1917 five squeegees were used on the smooth pavements, and this number was increased to seven in 1918. The average cost of squeegeeing the streets in the business district averaged 15.5 cents in 1917 and 19.4 cents in 1918, and the average costs in the residence district averaged 27.7 cents and 34.6 cents respectively, each being the cost per thousand square yards for one scrubbing.

As in 1917, the city' garbage was collected in 1918 by thirty city teams and fifty licensed garbage collectors. In 1918 the city paid $130 a month for teams as compared to $100 in 1917. One of the garbage farms to which the city delivered garbage paid 75 cents a load for the garbage up to September 1, 1918, and another paid $1.38 per load after that date for garbage from the same district. Garbage from another district had been sold at $1.00 per ton prior to September 1st. the same company paying $3.02 after that date. The third district received an increase from $1.00 a ton to $3.27 per ton at the same date.

The amount of garbage collected by city teams in 1917 was 5.414 tons and in 1918, 5,728 tons; and that collected by private collectors was 8,760 in 1917 and 9,432 in 1918. In spite of the increase, the collection in 1918 was much less than in 1916, when the amounts were 7,215 tons and 12,000 tons respectively. The amount of garbage collected during each of the months of the years 1915 to 1918 inclusive are shown on the accompanying diagrams.



GARBAGE COLLECTIONS IN ST. PAUL.

The receipts from hides and dead animals in 1918 was only $1,227 as compared to $2,172 in 1917. The receipts from garbage collected and from license fees in 1918 totaled $11,397, as compared to $5,183 in 1917.

Cleaning catch basins is all done by two crews, each consisting of a foreman and sixteen men, using eight 2-wheeled, 1-horse dump carts, two small derricks and windlasses and the necessary buckets. There are 8,650 catch basins in the city, and these are cleaned out "usually twice a year."

Sewer flushing is done by a crew of five men and a foreman, using 2½-inch fire hose with a ½-inch nozzle. Water used in flushing is paid for on the basis of 40 cents an hour for the time the hydrants are open, it being estimated from tests that this approximates three cents per hundred cubic feet. In 1918, 40,339 feet of sewer were cleaned in this way, using 5,705,000 gallons of water. The sand-rock sewer tunnels, of which there are thirty-one miles, are cleaned and repaired in the winter time when the flow in the sewer is low and uniform. The winter temperature in these sewers is about 60 degrees.

# WATER RATES AND FIRE PROTECTION CHARGES

## Data from Several Hundred Cities of the United States—Maximum and Minimum Rates—Changes Since Before the War—Receipts for Public Hydrants and Private Fire Protection.

### HYDRANT RENTAL.

Inquiries are frequently sent to this office concerning the hydrant rental charged in the different cities of the country by both municipial and private plants, and in order to obtain information on this subject, we included it in the questionnaire sent to water works officials a few weeks ago. The replies are given in the tabulated matter relative to meter rates and fire protection charges which are appearing in several consecutive numbers of Municipal Journal and Public Works. We have summarized

### METER RATES AND FIRE PROTECTION (Continued).

| City and State. | Municipal or Private. | Maximum Meter Rates | | Minimum Meter Rates. |
|---|---|---|---|---|
| | | Rate. | For consumption less than | |
| **Montana:** | | | | |
| Billings | Municipal | 25c per 100 cu. ft. | 7,500 per month | 5c per 100 cu. ft. |
| Kalispell | Municipal | 40c | 10,001 per month | 7½c |
| Libby | ........ | ........ | ........ | ........ |
| Livingston | Private | 37½c per 100 cu. ft. | 401 cu. ft. | 9c per 100 cu. ft. |
| **Nebraska:** | | | | |
| Aurora | Municipal | $1.25 per M | 1,001 and services per quarter | 15c per M |
| Columbus | Municipal | 20c per M | 250,001 per month | 10c per M |
| Hastings | Municipal | 18c | 8,001 | 8c |
| Lincoln | Municipal | 15c per M straight | ........ | ........ |
| North Platte | Municipal | 18c per M | 10,001 | 5c per M |
| Schuyler | Municipal | 20c per 100 cu. ft. | 1,001 | ........ |
| **New Hampshire:** | | | | |
| Berlin | Private | 30c per 100 cu. ft. | 1,500 cu. ft. per quarter | 10c per 100 cu. ft. |
| Claremont | Municipal | 15c per 100 cu. ft. | 3,001 cu. ft. per month | 7½c per 100 cu. ft. |
| Concord | Municipal | 22.2c per M | 1,001 per day | 5c per M |
| Lebanon | Municipal | 25c per M | 10,001 | 12½c per M |
| Nashua | Private | 15c per 100 cu. ft. | 10,001 cu. ft. for quarter | 3¾c per 100 cu. ft. |
| Newport | ........ | 40c per M | 30,000 | 13½c per M |
| Portsmouth | Municipal | 30c per 100 cu. ft. | 6,001 cu. ft. per quarter | 20c per 100 cu. ft. |
| **New Jersey:** | | | | |
| Atlantic City | Municipal | 12c per M straight | ........ | ........ |
| Bordentown | Municipal | 30c per M | 50,001 | 8½c per M |
| Bridgeton | Municipal | ........ | ........ | ........ |
| Camden | Municipal | 25c per M | 101 per day | 10c per M |
| Garfield | Municipal | 30c per 100 cu. ft. | 666 cu. ft. | 11c per 100 cu. ft. |
| Hammonton | Municipal | $12 per year | 780,000 | ........ |
| Harrison | Municipal | 11½c per 100 cu. ft. | ........ | ........ |
| Hawthorne | Municipal | 20c per 100 cu. ft. | 6,001 cu. ft. per quarter | 4c per 100 cu. ft. |
| Irvington | Private | 17c per 100 cu. ft. | 10,001 cu. ft. per quarter | 8½c per 100 cu. ft. |
| Jamesburg | Private | 40c per M | 30,000 | ........ |
| Milltown | Municipal | 25c per M | 1,001 per day | 9c per M |
| Newton | Municipal | 25c per M | 25,001 pr quarter | 4c per M |
| Nutley | Municipal | 31¼c per 100 cu. ft. | 1,200 cu. ft. | ........ |
| Pleasantville | Private | 35c per M | 50,000 | 12c per M |
| Rahway | Municipal | 15c per 100 cu. ft. | 1,001 cu. ft. | 4c per 100 cu. ft. |
| Weehawken. Camp Merritt & 45 municipalities. | Private | ........ | ........ | ........ |
| **New York:** | | | | |
| Albany | Municipal | 9 1-3c per M | 375,000 per day | 4c per M |
| Amsterdam | Municipal | 20c per 100 cu. ft. | 25,000 cu. ft. | ........ |
| Beacon | Municipal | 25c per 100 cu. ft. | 5,001 cu. ft. | 7½c per 100 cu. ft. |
| Canandaigua | Municipal | 6c per 100 cu. ft. | Straight | ........ |
| Corning | Municipal | 28c per M | 10,001 per quarter | 7c per M |
| Danville | Municipal | ........ | ........ | ........ |
| Elmira | Municipal | 30c per 100 cu. ft. | 10,000 gal. per quarter | 5c per 100 cu. ft. |
| Frankfort | Municipal | 21.2c per 100 cu. ft. | 1,166 cu.ft. per quarter | 5.45c per 100 cu. ft. |
| Fredonia | Municipal | 17c per M | 20,000 per year | 4c per M |
| Gloversville | Municipal | 12c per 100 cu. ft. | 5,001 cu. ft. per 6 months | 3½c per 100 cu. ft. |
| Herkimer | Municipal | 10c per M straight | ........ | ........ |
| Hudson | Municipal | 8c per M | ........ | 5c per M |
| Little Falls | Municipal | 14c per 100 cu. ft. | 2,001 cu. ft. per quarter | 3c per 100 cu. ft. |
| Mechanicsville | Municipal | 20c per M | 1,001 per day | 5½ per M |
| Middletown | Municipal | 12½c per 100 cu. ft. | 3,200 cu. ft. | 4c per 100 cu. ft. |
| Mount Morris | Municipal | 20c per M | 150,000 per 6 months | 8c per M |
| Mount Vernon | Private | 30c per 100 cu. ft. | 3,126 cu. ft. | 10c per 100 cu. ft. |
| Newark | Municipal | 30c | 20,001 | 10c |
| Niagara Falls | Municipal | 8c per 100 cu, ft. | 20,001 cu. ft. per quarter | 3c per 100 cu. ft. |
| North Tarrytown & 6 other municipalitles | Private | 28c per 100 cu. ft. for low service district; 35c per 100 cu. ft. for higher service district | 40,001 cu. ft. per year | 17½ per 100 cu. ft. for low service district; 23c per 100 cu. ft. for high service district |
| Norwich | Private | 27½c per 100 cu. ft. | 1,001 cu. ft. | 3c per 100 cu. ft. |
| Ogdensburg | Municipal | 10c per M | ........ | ........ |
| Olean | Municipal | ........ | ........ | ...... |
| Owego | Private | 30c | 50,001 per month | 5c |
| Peekskill | Municipal | 15c per 100 cu. ft. | 301 cu. ft. daily | 7c per 100 cu. ft. |
| Port Jervis | Private | 16c per M | 1,000,000 per day | 3c per M |
| Potsdam | Municipal | ........ | ........ | ........ |
| Poughkeepsie | Municipal | 20c per M | 37,500 per quarter | 10.7 per M |
| Rome | Municipal | 20c per M | 7,001 | 2c per M |
| Solvay | Municipal | 20c per M | 30,001 | 12c per M |
| Schenectady | Municipal | 5c per 100 cu. ft. | 10,001 | 4c per 100 cu. ft. |
| Seneca Falls | Private | 20c per 100 cu. ft. | 1,001 cu. ft. | 10c per 100 cu. ft. |
| Sidney | Private | ........ | ........ | ........ |
| Syracuse | Municipal | 11c | 45,000 per month | 4½c |
| Tarrytown | Municipal | 30c per 100 cu. ft. | 4,001 cu. ft. | 11c per 100 cu. ft. |
| Tonawanda | Municipal | 11c. | 1,001 per day | 2½c. |
| Troy | Municipal | 5c. flat | ........ | ........ |
| Waverly | ........ | 30c. per 100 cu. ft. | 1,001 cu. ft. per quarter | 5c. per M |
| Wellsville | Municipal | 23c. per 100 cu. ft. | 1,501 cu. ft. | 7½c. per 100 cu. ft. |
| **North Carolina:** | | | | |
| Concord | Municipal | 31c. per M | 25,001 per quarter | 8c. per M |
| Henderson | Private | 40c. | 30,001 | ........ |
| Monroe | Municipal | 50c. per M | ........ | ........ |
| Statesville | Municipal | 35c. per M | ........ | 15c. per M |
| Wilmington | Municipal | 15c. per 100 ft. | 2,001 cu. ft. | 8c. per 100 cu. ft. |
| **North Dakota:** | | | | |
| Fargo | Municipal | 10c. per M | Flat rate per 6 months | ........ |
| Wahpeton | Municipal | 23c. per M | 5,001 per day | 10c. per M |

## METER RATES AND FIRE PROTECTION (Continued).

| City and State. | Minimum Meter Rates For consumption more than | Increase since before the war. | City pays for fire hydrants. | Charge for private hydrants or sprinklers. |
|---|---|---|---|---|
| **Montana:** | | | | |
| Billings | 1,500,000 per month | None | $40 each per year | 2" line—$20 per year; 4"—$36<br>6"—$40 |
| Kalispell | 500,000 per month | None | $40 each per year | No charge |
| Libby | ........ | None | $60 each per year | ........ |
| Livingston | 50,000 cu. ft. | None | Nothing | ........ |
| **Nebraska:** | | | | |
| Aurora | 25,000 per quarter | None | Nothing | ........ |
| Columbus | 250,000 per month | None | Nothing | None |
| Hastings | 10,000,000 | 12% | $9 each per year | None |
| Lincoln | ........ | None | Nothing | $18 per year private hydrant |
| North Platte | 1,000,000 | 20% | $60 per year, $1,000 for flushing sewers | $2 per sprinkler head |
| Schuyler | ........ | (e) | $1,000 per year for 55 hydrants | None |
| **New Hampshire:** | | | | |
| Berlin | 60,000 cu. ft. per quarter | None | $40 each per year | None |
| Claremont | 5,000 cu. ft. per month | None | $30 each per year | $25 per year per hydrant |
| Concord | 300,000 per day | None | Nothing | Hydrants $30 each, sprinklers 7½c. each per year |
| Lebanon | 20,000 | None | Nothing | None |
| Nashua | 1,250,000 cu. ft. per quarter | None | $30 per year | None |
| Newport | 1,000 per day | None | Nothing | None |
| Portsmouth | 6,000 cu. ft. per quarter | 5c. per 100 cu. ft. | $40 per year | Metered |
| **New Jersey:** | | | | |
| Atlantic City | ........ | None | Nothing | None |
| Bordentown | 1,150,000 | None | Nothing | $100 per year |
| Bridgeton | ........ | ........ | Nothing | None |
| Camden | 10,000 per day | Maximum from 20c. to 25c. & so on | Nothing | ........ |
| Garfield | 1,000 cu. ft. | None | $30 per year | $30 for hydrants & 25c. for each sprinkler head |
| Hammonton | ........ | None | Nothing | None |
| Harrison | ........ | None | Nothing | Meter by Hersey detector meter |
| Hawthorne | 20,000 cu. ft. per quarter | None | $25 per year | 50c. per quarter |
| Irvington | 1,000,000 cu. ft. per quarter | ........ | $6 & $8 each per year | Metered |
| Jamesburg | ........ | None | $17.50 per year | None |
| Milltown | 100,000 per day | None | Nothing as yet | Have none |
| Newton | 6,000,000 per quarter | None | Nothing | ........ |
| Nutley | ........ | None | Nothing | None |
| Pleasantville | 100,000 | Awaiting decision | $25 each | Only 1 sprinkler; $317 per year plus water used |
| Rahway | 5,000 cu. ft. | None | $500 per year maintenance | None |
| Weehawken, Camp Merritt & 45 municipalities. | ........ | Slightly lowered; application for 20% increase | ........ | ........ |
| **New York:** | | | | |
| Albany | 375,000 per day | From 8c. to 9⅓c. | Nothing | None |
| Amsterdam | ........ | None | Nothing | None for private hydrants, 4c. ft. sprinkling |
| Beacon | 500,000 cu. ft. per quarter | None | $2,000 per year for 177 hydrants | None |
| Canandaigua | ........ | None | Nothing | Metered |
| Corning | 1,000,000 per quarter | None | $9.14 each | $15 per year |
| Danville | ........ | ........ | Nothing | None |
| Elmira | 7,500,000 gal. per quarter | None | $12,000 | None |
| Frankfort | 116,666 cu. ft. per quarter | None | Nothing | None |
| Fredonia | 3,000,000 | None | Nothing | $3 per year for sprinklers |
| Gloversville | 25,000 cu. ft. | None | Nothing | None |
| Herkimer | ........ | Proposed | Nothing | None |
| Hudson | ........ | None | Nothing | $5 per year |
| Little Falls | 12,000 cu. ft. per quarter | Maximum rate lowered, minimum raised | Provision in charter for $6,500 per year—not paid recently | None |
| Mechanicsville | 20,000 per day | None | Nothing | None |
| Middletown | 30,000 cu. ft. | None | Nothing | $2.50 per year |
| Mount Morris | 6,000,000 per 6 months | None | Nothing | None |
| Mount Vernon | 100,000 cu. ft. | Probably June 1st, 1919 | $40 each per year | Hydrants $40 each per year; sprinkler heads 10c. each |
| Newark | 50,000 | 25% | Nothing | $5 per year flat rate |
| Niagara Falls | 250,000 cu. ft. per quarter | None | $35 each | None |
| North Tarrytown & 6 other municipalities | 1,000,000 cu. ft. per year | ........ | $7 each per year in addition to inch-foot charge | $7 per hydrant per year; sprinklers, 2"—$24 to 8"—$254 per quarter |
| Norwich | 80,000 cu. ft. | 50c. on minimum meter rate per quarter | $23.40 (33 hydrants being installed) | None |
| Ogdensburg | ........ | None | None, sorry to say | $40-$80 per year |
| Olean | ........ | 25% account of filtration plant put into operation | $20 each per year | ........ |
| Owego | ........ | None | $40 each | ........ |
| Peekskill | 20,000 cu. ft. daily | 50% | Nothing | Meter rates |
| Port Jervis | 1,000,000 per day | None | $16.67 each | $15 each |
| Potsdam | ........ | None | Nothing | $1 per year |
| Poughkeepsie | 20,000 | None | Nothing | None |
| Rome | 700,000 | None | Nothing | None |
| Solvay | 30,000 | None | $40 each per year | $40 per hydrant per year |
| Schenectady | 10,000 | None | Nothing | $2 per year |
| Seneca Falls | 5,000 cu. ft. | None in meter rates | Lump sum | $20 per year hydrant; 5c. per year sprinklers |
| Sidney | ........ | 30% | $40 per year | None |
| Syracuse | 210,150 per month | None | Nothing | None |
| Tarrytown | 300,000 cu. ft. | None | $40 each per year | Metered |
| Tonawanda | 20,000 per day | None | Nothing | Meter rates |
| Troy | ........ | None | Nothing | None |
| Waverly | 1,500,000 gal per month. | None | $2,000 per year | None |
| Wellsville | 20,000 cu. ft. | 20c to 23c minimum; 6 2-3 to 7½c maximum; further increase proposed | $5,000 per year | Sprinkler, 10c per head; minimum, $50 per year. |
| **North Carolina:** | | | | |
| Concord | 2,000,000 per quarter | None | Nothing | $40 per hydrant |
| Henderson | ........ | 25% in 1917 | $40 for first 68; $35 for additional | $40 per year; $4 per 1,000 sq. ft. |
| Monroe | ........ | None | Nothing | None |
| Statesville | ........ | 33⅓% | No credit given | ........ |
| Wilmington | 50,000 cu. ft. per quar. | 25% | $40 each per year | Valuation of property basis |
| **North Dakota:** | | | | |
| Fargo | ........ | Decreased | $20 per year, hydrant, sprinkling and flushing; $36, fire protection; $5, construction uses | Meter rates |
| Wahpeton | 3,000 per day | None | Nothing | Have none |

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(e) Slight increase in all bills below $3.45; all over that less.

the figures given, including that part of the table which has not yet appeared, and give the results below.

About four hundred cities replied to the question, although several of them have a method of charging for fire hydrants which could not be readily tabulated. Among these are Stockton, Cal., where a private plant charges $12 per hydrant per year, but the city owns the hydrants. In Putnam, Conn., the city pays for all water used through hydrants. In Burlington, Ia., a private plant, a 5-mill tax on all property in the water district is paid to the company for fire protection. In Muscatine, Ia., the city pays the interest on water bonds, which is assumed to serve as reimbursement for the fire protection. Marysville, Ky., paid the company $65,000 for perpetual protection. Traverse City, Mich., pays the municipal plant $35 per year per hydrant and also $300 a year for the use of the hydrants for street sprinkling. In Chisholm, Minn., $1 per capita per year is turned over to the department as payment for fire protection. In North Platte, Neb., the water department receives $60 per hydrant and $1,000 for flushing sewers. The company serving North Tarrytown, N. Y., and six other municipalities receives $7 per hydrant per year in addition to a charge based on the inch-foot of mains in service. Fargo, N. D., pays the department $20 per hydrant for use in sprinkling and flushing, $36 for fire protection and $5 for construction uses. Beaver Falls, Pa., pays the private company for fire protection $400 per mile of main and $7 for each fire hydrant. Chester, Pa., pays $40 for each thousand feet of pipe. Wilksburg, Pa., pays the company $275 per mile of main and $3 additional for each hydrant.

*(To be continued)*

## BOONVILLE MUNICIPAL WATER WORKS.

A short time ago we received a report of the Board of Public Works of Boonville, Mo., which contains two features of interest. One is that it gives the history of the municipal water works from the time it was purchased from the private owners in 1905 up to date, showing that it has been a profitable investment. The other is that, although the Board of Public Works has been operating this plant for fourteen years, this is the first report which it has made. During this time the personnel of the board was entirely changed, no member of the present board having served for more than seven years. With such an excellent showing as that which appears from this their first report, it seems all the more remarkable that they have not seen fit to set forth before this in a public report the activities of the board and the development of the water works.

Previous to the acquisition of the water works property in 1905, the company owning it had charged $60 per year for each of the fifty-three fire hydrants in use. The pressure available was insufficient to give adequate protection, this in fact being one of the complaints against the service that led to the purchase by the municipality. During the negotiations the company offered to reduce this rate to $45 per year.

Since the purchase, the city has paid all but $4,000 of the cost of the plant, representing a gross inevestment of $121,000, has set aside $33,000 for depreciation, has accumulated approximately $6,000 surplus, and has made all necessary additions and betterments to the plant, including increased and reserve pumping capacity, an increase in the distribution system by two-thirds, a purification plant, and an increase in the reservoir capacity and fire protection.

Meantime, the rates have been no higher than in other cities of the same size, whether under private or municipal ownership, and have been lower than in some. Of the original outstanding bonded debt, the city has retired all but $4,000. The tax levy by which these results were accomplished has been 35 cents per $100 valuation.

The purchase price for the property was $52,500, based on a valuation made by engineers employed by the city in 1903, plus expenditures by the company after that time. The property purchased included about 31,000 feet of distribution mains, 28 acres of land, pumping station and other buildings, reservoirs and a brick tower supporting a wooden tank. Of the original property, only the distribution system and land are still in service. Immediately upon acquiring the property, the city began making improvements, adding in 1905 some 15,000 feet of mains with additional fire hydrants, a mechanical filter of one million gallon capacity and a steel tower with a 70,000 gallon tank. A concrete coal shed has been added to the pumping station. The distribution system at present contains about 50,000 feet of mains, of which 78 per cent is six inches diameter or larger, and 2,100 feet is ten-inch. There are now on the distribution system ninety-four fire hydrants within the city and six (which are state property) have been installed at the Reform school, which purchases its water from the city water department. Metering is believed to be the only equitable method of charging for water, and at the end of 1918, 427 of the 703 customers were metered, and the department is using every endeavor to place the others on a metered basis.

The water is obtained from an "intake well" of "practically unlimited capacity" located on the bank of the Missouri river. A ten-inch and a fourteen-inch suction line extend from this well a distance of about fifty feet to the pumps. The pumping equipment consists of one 2,000,000-gallon and one 1,000,000-gallon steam pump, and one 125 h.p. and one 75 h.p. horizontal boiler.

The water is purified by coagulation and sedimentation in three reservoirs operated in series, the total capacity of which is about four and a half million gallons. Lime and sulphate of iron are added to the water before entering the reservoirs.

"The water department has been operated with a view towards making a minimum profit. It has been operated with a view towards supplying pure water at a minimum cost but not at a price less than cost." In 1918 the meter rates varied from nine cents per thousand gallons to thirty-five cents, with a minimum bill of seventy-five cents a month. Previous to the increased cost due to the war, the minimum rate had been eight and a half cents and the minimum payment fifty cents a month.

In addition to paying for the property and acquiring the reserve, free service has been given to the city for watering troughs, sewer and street flushing and services to the city offices, as well as fire protection, and previous to 1918 free service was given to the schools also. It is estimated that this free service was worth $4,580 in 1918, and that the average during the fourteen years has exceeded $3,500 a year, or totaled at least $49,000.

## STATE EXPENDITURES FOR ROADS.

The Bureau of the Census is soon to issue a report on the "Financial Statistics of States for 1918," in which it will show that the total outlay of the states for permanent improvements was $66,207,696; and that of this amount, $40,071,045 was spent for roads, $21,951,415 directly by the states, and $18,119,630 was turned over to counties, municipalities and other minor civil divisions for highway purposes.

California led with an outlay of $5,273,845; New York was second, with $4,059,887; followed by Maryland, $2,150,619; Washington, $1,907,525; Ohio, $1,871,811; Massachusetts, $1,815,192, and Pennsylvania, $1,258,022. Eight states spent nothing for roads, either as outlays or as apportionments.

# The WEEK'S NEWS

**U. S. Bureau of Public Roads Distributes Large Army Stores to State Highway Departments—Massachusetts Studying Water Resources of State—New Jersey Utilities Commission Claims Power Over Municipal Plants—Canada Coordinates Water Power Investigations—Chicago Firemen "Strike"—Columbus Fire Department Motorized—Army Truck Convoy Pioneering Across Continent—Massachusetts to Have New Utilities Commission.**

## ROADS AND PAVEMENTS

### Improved Type of Bridges Built by State.

Harrisburg, Pa.—State Highway Commissioner Lewis S. Sadler has announced that bids will be opened August 18 for the construction of sixty-six concrete bridges in various part of the state. The structures range in span from 8 to 36 feet. Under the present plans of the department, the danger of washouts from high water is reduced to a minimum, inasmuch as plans for all bridges now under construction or to be constructed in the future by the department call for more waterway than was the case a number of years ago. The foundations are deeper and the clear openings of the span higher and wider. The department is building no temporary structures. All are to be of heavy reinforced concrete, containing the best type of steel. One of the largest structures to be built by the department this year is that on the Lackawanna Trail near Nicholson Borough. This is a monumental structure of three spans, each 135 feet in length. The bridge is to be of reinforced concrete with pylon approach.

### Federal Distribution of Highway Materials and Equipment.

Washington, D. C.—The Department of Agriculture, according to a report to Congress, is distributing through the Bureau of Public Roads, large allotments of materials and equipment from surplus war supplies no longer needed by the War Department. This equipment and material is included under general heads as follows: Motor trucks and motor cars; construction and operating equipment; construction materials; field and office equipment; camp, mess and kitchen equipment; general supplies, machine tools, woodworking tools and miscellaneous outfits, and animals. The total value of the various items under these heads is very large, the value of the motor-truck equipment alone being estimated at more than $70,000,000. The equipment and supplies are being distributed under an act of Congress which instructed the Secretary of War to deliver surplus war materials to the Department of Agriculture to be used in the construction and maintenance of roads constructed in part or in whole by Federal aid. This material is allotted to the states on the same basis as Federal aid and represents an addition to the Federal aid given by the various appropriations. Allotments of motor vehicles are now reported by the Secretary of Agriculture to be complete. Large numbers of these trucks and other motor vehicles have already been shipped to the states concerned. A total of 20,586 trucks, 1,075 Fords and 550 other automobiles are to be distributed. Texas comes first with 1,199 trucks, 58 fords and 30 autos. New York is second with 1,021, 50 and 25 respectively. Other equipment is as follows:

*Construction and Operating Equipment*—The materials under the other headings are being delivered to the Department of Agriculture as rapidly as possible, and an attempt is to he made by the Secretary of War to cover the estimated needs of the various state highway departments as given to him by the Secretary of Agriculture. The estimate of construction and operating equipment includes such items as road rollers, 400; concrete mixers, 700; road graders, 600; elevating graders, 400; sprinkling wagons, 400; road oilers, 200; trailers and tractors, 3,600; dump wagons, 6,500; industrial railway dump cars, 3,500, and 1,000 miles of industrial-railway track. The total number of items included under this heading is 52.

*Construction Material*—Under the head of construction materials there are such items as the following: Bituminous hinder, 550,000 barrels; lineal feet of prepared joint filler, 50,000; bags of portland cement, 2,110,000; tons of gravel and crushed stone, each, 1,000,000; lineal feet of steel forms, 40,000; industrial-railroad ties, 674,000; lineal feet of cast-iron culvert pipe, from 12 to 36 in. in diameter, 56,025, and 10,000,000 lb. of TNT (trinitrotoluene). Under this heading 31 items appear.

*Field and Office Equipment*—Listed as field and office equipment are 40 items, among which are engineers' transits, 1,000; engineers' levels, 1,146; Abney's levels, 1,188; Universal drafting machines, 228; planimeters, 592, and 366 adding machines.

*Camp Mess and Kitchen Equipment*—Under the head of camp mess and kitchen equipment 11 items occur, such as tents, 17,000; army blankets, 25,100; square feet of tarpaulin, 316,000, and 460 complete outfits of mess and kitchen equipment for units of various sizes, averaging 40 men.

As general supplies there are 40 items, one of which is 63,000 shovels, and under machine tools, woodworking tools and miscellaneous outfits there are 18 items, among which are complete machine outfits, 15; complete sets of carpenters' tools and chests, 306, and 552 complete sets of blacksmiths' outfits with forges, drills and other accessories.

### Court Decision Halts Street Work.

Charleston, W. Va.—Street improvements will probably be at a standstill in Charleston for the next two years, or until the next legislature meets and amends the present city charter, according to a decision handed down by the West Virginia supreme court of appeals. This decision was given in the test suit brought some time ago in Kanawha circuit court by S. F. Bonham against the city of Charleston questioning the right of the municipal authorities to assess the cost of curbing and paving intersections of a certain block of Monongalia street against owners of abutting property. He won his contention in the lower court, and now the highest court in the state upholds the circuit court decision. It is claimed that the new municipal charter enacted into law by last legislature left a loophole on the paving cost question, and property owners' attorneys were not slow to take advantage of it. The city has no fund for street paving purposes and since 1916 has been assessing the costs of such improvements against abutting property owners. New legislation or an appropriation of levy will therefore be necessary before any more streets can be improved, under the decision.

## WATER SUPPLY

### City Appeals Water Damage Case.

Providence, R. I.—A verdict of $334,636, together with special findings, was returned by the jury, for the S. H. Greene & Sons Corporation against the city of Providence, in a "million-dollar" water suit in the Kent county superior court at East Greenwich. In the special findings asked for by the city of Providence the jury finds that 72,000,000 gallons of water per week is sufficient for all purposes of the Green plant, excepting water power; that the Interlaken Mills and Pawtuxet Valley Dyeing Company have a prescriptive right to discharge mill wastes into river, and that the discharge of the mill wastes from these two mills did not impair the water at the Petaconset pumping station for a public water supply. The case was the most difficult and most important of its kind ever tried before a jury in this state. It is the first of the big mill cases, so called. against the city, of which there are others to follow, with relation to taking water from the Pawtuxet river for the Kent reservoir for a public water supply. Many novel questions are raised and precedent is established. Moreover, prescriptive rights are determined which are new questions in this state. The amount is less than was anticipated by the plaintiff and more than was expected from the jury by the defendant. The plaintiff claimed $1,000,000, whereas the city's attorneys argued to limit damages to $62,000. The city has filed a motion for a new trial on the grounds that the verdict was against the law and the evidence, and that the damages awarded the plaintiff are excessive.

### To Test Water Supply Legislation.

Akron, O.—The constitutionality of the bill passed by the general assembly to provide for the impounding of the water in the lakes and reservoirs contiguous to Akron to provide that city with a water supply, will be tested in the courts. One of the leading law firms in Columbus—that of former attorney-general Joseph McGhee and L. D. Johnson, former special counsel in the attorney-general's office—has been retained to bring a suit with a view to have the law knocked out. Akron citizens whose names have not been made known and labor organizations of the city, it is understood, are behind the movement for the annulment of the law. Under the law, the state impounds the water and leases it for a term of years. Bonds of $2,000,000 are to be issued to cover the cost of the project and the rentals are to yield the money for payment of the bonds. The contention is made by those opposed to the law that the act is in violation of the constitution. The suit will be brought in the Franklin county common pleas court.

### State Studying Water Supplies of Massachusetts.

Boston, Mass.—An investigation of the water-supply needs and resources of Massachusetts is to be made jointly by the State Department of Health and the Metropolitan Water and Sewerage Board, under a recent act of the legislature. The investigation is to include "all questions relating to the quantity of water to be obtained from available sources, its quality, the best methods of protecting the purity of the water, the construction, operation and maintenance of works for storing, conveying and purifying the water, the cost of the same, the damages to property, and all matters pertaining to the subject." A report is to be made to the legislature by January 5, 1921. A general organization for the study has been effected. X. H. Goodnough, chief engineer of the State Department of Health states that besides the needs of Boston and vicinity for more water, before many years consideration must be given to the water-supply problems of cities in southeastern Massachusetts, in the Merrimack and the Ipswich Valleys and in other thickly populated areas to the west and south of the present Metropolitan district.

## STREET LIGHTING AND POWER

### State Commission Has Power Over City Plants.

Madison, N. J.—The State Board of Public Utility Commissioners has ordered the borough officials of Madison to make a number of improvements in the municipal electric plant and system, so as to provide safe and adequate service. The city held that the commission had no power to make an inspection of the plant or to direct any betterment work. The board says: "The observance of the recommendations is resisted by the municipality on the ground that this board has no power over its electric plant because it confines its service to the municipal limits and does not serve consumers outside thereof. They fear the encroachment of powers reposed exclusively in them. The section of the law conferring the authority, however, makes it the duty of the board to see that its standards of service are maintained alike by public utilities and municipalities engaged in operating public utilities, so that the public served may be insured safe, adequate and proper service. With its experience in matters of standards of equipment and service to be maintained to thus insure safe service, and because of the expertness of its engineers in such matters, both privately and publicly owned utilities rather welcome than resent the inspection of plants, so as to receive the suggestions and recommendations of the Board and its engineers to improve their service. We assume the municipal authorities are disposed to furnish the inhabitants of the borough the best service reasonably possible. To do this it is necessary that the things required to be done and recommended in the inspector's report should be complied with."

### Commissioner Denies 55 Per Cent Increase.

Hudson, Wis.—The state railroad commission at Madison has denied the 55 per cent increase in gas rates asked by the Interstate Light & Power Company of Hudson, but granted an increase of substantially 20 per cent. The company owns the Hudson utility but buys its gas from the Northern States Power Company at Stillwater, Minn. The company petitioned for authority to increase its rates, alleging its present schedule, with a primary rate of $1.54 per thousand cubic feet, had never brought sufficient revenue to meet operating expenses. The commission decided that while from the standpoint of cost of service the request was not unreasonable, so great an increase in a city where electric rates are unusually low, would mean such curtailment of gas consumption as to make the company's situation less favorable than at present, and what was more serious, the people of Hudson ultimately might be deprived of gas service. Also to grant no increase under the circumstances soon might result likewise. The new schedule, which will go into effect next month, is as follows: First 2,000 feet per month, $1.75 per thousand net; next 3,000 feet per month $1.60 per thousand net; next 5,000 feet per month, $1.50 per thousand net; all over 10,00 feet per month, $1.40 per thousand net.

### Canadian Water Power Investigations Co-ordinated.

Toronto, Ont.—Following an order in council issued by the Canadian government steps have been taken to investigate and develop the water-power resources of Canada. The order provides for the coordination of departments and standardization of methods more particularly in respect to the investigation of power resources. It is reported that the provinces of Nova Scotia and New Brunswick have requested a renewal of the cooperative arrangement of hydrometric investigations under the direction of the Dominion Water Power Branch. Applications have been filed by the provinces of Ontario and Prince Edward Island for the inauguration of similar arrangements. The order in council authorizes agreements for this purpose and provides that such cooperative water resources and power investigations shall be under the control and management of an officer of the Department of the Interior. It then designates the superintendent of the Dominion Water Branch as Director of Water Power. Originally the Dominion Water Power Branch controlled and administered the water resources of the provinces of Manitoba, Saskatchewan, and Alberta, the Northwest Territories, and the Territory of Yukon, and by cooperative arrangements carried on the water-resources investigations in the province of British Columbia. Other provinces which controlled their own natural resources had separate organizations for investigation. In 1915 a similar arrangement was entered into with the province of Nova Scotia and in May, 1918, with the province of New Brunswick. Under the above-mentioned order in council similar agreements will be made with the provinces of Ontario and Prince Edward Island. With the exception of the province of Quebec, the water-resources investigations of Canada will be carried out in a uniform manner under the direction of the Federal Director of Water Power. The Dominion Water Power Branch is an advisory body with the special function of coordinating the development of water and fuel power and consolidating the experience, research and efforts of all the government and provincial departments concerned. It consists of the Minister of the Interior as chairman with nine permanent department officials as members representing the Department of the Interior, the Department of Public Works, the Department of Railways and Canals, the Department of External Affairs regarding International Waters, the Department of Inland Revenue, the Department of Mines, the Dominion Railway Commission, and the Hydro Electric Power Commission of Ontario.

## FIRE AND POLICE

### Chicago Firemen Walk Out.

Chicago, Ill.—About 250 fire department engineers and assistants went on strike recently for higher pay. The fire chief, O'Connor, announced that substitute engineers would be used. Electricians said that should substitute engineers be used they would strike. The city had declined to meet the demands of the men for higher wages. All the men who left their posts tendered their resignations to their superior officers before walking out. The five fire tugs stationed in the river were not affected. A committee of ten representatives of the men who resigned was appointed to negotiate with the finance committee of the city council for settlement.

### Fire Department Practically Motorized.

Columbus, O.—The fire department of Columbus is now virtually on a motor basis through the recent action of the city board of purchase in letting a contract for ten pieces of motor equipment necessary to complete the department's motorization. The new equipment will include four 750-gallon triple combination pumpers, one 1,000-gallon double combination pumper, one 85-foot tractor-drawn hook and ladder truck, two two-wheel front-driven steamer tractors and two four-wheel truck tractors. The amount of the contract is $103,000. This equipment will take the place of all horse-drawn appliances at present in use in the fire houses.

## TRAFFIC AND TRANSPORTATION

### Bill Vetoed for Municipal Ownership Beyond City.

Harrisburg, Pa.—Governor Sproul has vetoed the Stadtlander bill, passed by the last Legislature, which would have granted municipalities the right to own and operate street railway systems beyond their municipal limits. In his message accompanying the veto, Governor Sproul observed that the bill was bad in principle. The right to own and operate a railway outside its own boundaries would enable a municipality to exert powers within the boundaries of another municipality, clearly an injustice, and a condition that would lead to undesirable results, he declared.

### Transcontinental Army Truck Convoy to Get Data.

Washington, D. C.—A large convoy of army motor vehicles is making a pioneer transcontinental trip to study problems of efficient highway transportation and to arouse interest in the subject. The convoy left Washington July 7 and is scheduled to reach San Francisco by Sept. 1. The route has been laid out over the Lincoln Highway in easy stages varying from about 30 to about 85 miles per day, with convenient Sunday rest periods. The caravan consists of over sixty vehicles and more than 290 officers and men. The control points on the journey are as follows: Washington, D. C.; Frederick, Md.; Chambersburg, Pa.; Bedford, Pa; Greensburg, Pa; East Palestine, O.; Wooster, O.; Bucyrus, O.; Delphos, O.; Fort Wayne, Ind.; South Bend, Ind.; Chicago Heights, Ill; De Kalb, Ill.; Clinton, Ia.; Cedar Rapids, Ia.; Marshalltown, Ia.; Jefferson, Ia.; Council Bluffs, Ia.; Omaha, Neb.; Columbus, Neb.; Grand Island, Neb.; Lexington, Neb.; North Platte, Neb.; Big Springs, Neb.; Kimball, Neb.; Cheyenne, Wyo.; Laramie, Wyo.; Medicine Bow, Wyo.; Rawlins, Wyo.; Tipton Station, Wyo.; Green River, Wyo.; Fort Bridger, Wyo.; Evanston, Wyo.; Salt Lake City, Utah; Orr's Ranch, Utah; Sheridan's Ranch, Ibapah, Utah; Ely, Nev.; Eureka.; Austin, Nev.; Westgate, Nev.;' Fallon, Nev.; Carson, Nev.; Myers, Calif.; Placerville, Calif.; Sacramento, Calif; Stockton, Calif.; Oakland, Calif.; San Francisco, Calif. The convoy is making good time and is everywhere being received with ovations by officials and citizens. Regional and state chairmen and other members of the organizations of the Highways Transport Committee of the United States Council of National Defense have been urged to take advantage of an invitation issued officially on behalf of C. B. Drake, Brigadier-General, General Staff Chief, Motor Transport Corps, U. S. Army, to meet the convoy as it passes through their states, and take advantage of the opportunity to learn what is being done through it. Members of the organization who may meet the convoy are asked to see Lt. Col. Chas. W. McClure, in charge of the convoy. A letter from General Drake to the Highways Transport Committee sets forth in part what it is hoped will be accomplished through this cross-continent tour. Exhaustive and complete statistics will be made of each vehicle that participates. Records will be kept of tire performance, gasoline, oil and grease consumption, repairs, character and condition of pavements, grades traversed, and by other data that might prove of value. Photographs, still and motion, will be taken throughout the route. The statistics and data compiled from this trip will be used as a basis upon which the Motor Transport Corps eventually will establish a library of motor statistics for public distribution. The Motor Transport Corps will endeavor to establish those relations with the public, in a motor transport way, that the Bureau of Mines and the Department of Agriculture now exercise in their activities. Secretary of War Baker, in an address delivered on the occasion of the starting of the convoy, gave strong personal and official approval to the ends sought.

## GOVERNMENT AND FINANCE

### New Utilities Commission for Massachusetts.

Boston, Mass.—The state legislature of 1919, before ending its session, passed an act which reorganized the machinery for regulating public utilities and abolished the Gas and Electric Light Commission and the Public Service Commission. A new Department of Public Utilities has been created, with a commission of five members, to be appointed by the Governor with the consent of the Council for initial terms of one to five years and a later standard term of five years. The yearly salary of the chairman is to be $8,000 maximum and those of the other commissioners are not to exceed $7,000 each. All the powers and responsibilities of the two commissions now merged are carried into the new tribunal. Appeal from and enforcement of its decisions lie in the Supreme Court of the state. To facilitate its work, two commissioners may hear cases and on agreement of all parties one member may sit. Routine and administration matters may be heard by one member. It is expected that the reorganization will effect economies in administration and in rent. The salaries of the commissioners are to be paid from the tax levy and utility companies will no longer be directly assessed for these, as was formerly the case in the regulation of gas and electric companies. The consolidation of about one hundred state departments into twenty has been effected by the act.

### Technical Employes Want Living Wage.

New York, N. Y.—Following a meeting of the Union of Technical Men, an appeal was issued to various city, borough and county officials, to the Board of Estimate, Public Service Commission, Board of Aldermen and the Transit Construction Commission, asking that suitable salary increases be provided for members of the union, in order that they may keep up with the high cost of living. A flat increase of $500 in the salaries of the technical men employed by the city of New York is asked. The increase will affect about 2,500 men in the city departments. About 2,370 of these men are now receiving less than $3,000. The appeal states that the increases would require in the neighborhood of $1,250,000 for the city departments, of which not more than $625,000 would probably be charged on the budget. The Transit Construction Commission would require $330,000 additional, chargeable to rapid transit funds. The salaries of the workers, the union claims, has advanced but 5 per cent in the last four years. The technical men prepare the plan and specifications for and supervise the construction and maintenance of public works. In the union there are also members who are employed by architects, builders, contractors, etc., who are handling private construction.

# THE MUNICIPAL INDEX

## In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading ones published in other countries, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In addition to the titles, where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article. Also the name and the place of publication of the periodical in which it appeared.

### ROADS AND STREETS.

**Costs:**

Cost and Service of New York State Highways. Discussion of actual costs of improved state highways in New York and of service rendered. By G. C. Diehl, co. engr., Erie co., N. Y. 2,300 words. Good Roads, July 23, New York.

Good Roads Pay for Themselves Twice Every Year. Statistics for three roads in Los Angeles county, Cal., show large operative income from decreased haulage cost. By J. C. Veenhuyzen, supt., county road dept., Los Angeles. 1,300 words. Engineering News-Record, July 31, New York.

The Cost of a Mile of Road. Three diagrams presenting elemental facts pertaining to cost of a mile of road; transportation costs, annual cost and total cost of traffic per ton mile. From paper at Engineering and Road Builders' Congress at Mineral Wells, by G. A. Duren, state highway engr. of Texas. 3 diagrams, 1,000 words. Canadian Engineer, July 24, Toronto, Can.

**Financing:**

Financing of Highway Improvements. Maintenance from motor fees; direct appropriations and special assessments; bond issues becoming popular. Address before State Highway Officials, by J. E. Pennybacker, sec'y, of the Asphalt Ass'n, formerly of U. S. Bureau of Public Roads. 2,800 words. Canadian Engineer, July 10, Toronto, Can.

Road Tax on Gasoline. Letter from C. A. Mullen, director of Paving Dept., Milton Hersey Co., Ltd., Montreal, Can., suggesting a tax on gasoline used in motor vehicles as an equitable means of raising funds for roads. 300 words. Municipal Journal and Public Works, July 26, New York.

The New State Road Law of Iowa. Measure enacted by 1919 legislature provides for improvement of 6,000-mile system of primary highways. 2,300 words. Good Roads, July 16, New York.

**Concrete:**

Charted Summary of State Concrete Road Specifications. Information arranged for quick determination of main features; explanation of and comments on chart. By A. N. Johnson, consulting highway engr., Portland Cement Ass'n, Chicago. 1 table, 1,500 words. Engineering News-Record, July 24, New York.

Constructing Concrete Pavements. Standard practice as recommended by the Mississippi Valley Association of State Highway Departments; materials and construction. 2,800 words. Municipal Journal and Public Works, July 12, New York.

Thickness of Concrete Slabs for Highway Surfaces. Maximum leads, condition of subsoils, and impact are all factors; experiments indicate latter is very important. 3 ills., 2,100 words. Engineering News-Record, July 31, New York.

Constructing Concrete Road near Norfolk. Up-to-date machinery and methods employed; central mixing plant and distribution of concrete by trucks; time study of mixing and distribution; mechanical finisher used; cost figures. By W. A. Hardenbergh. 1 ill., 2,200 words. Municipal Journal and Public Works, July 5, New York.

The Organization of Efficient Concrete Road Construction Gangs. By Hulbert P. Gillette, editor. 2,300 words. Engineering and Contracting, July 2, Chicago, Ill.

Suggestions for the Construction of Concrete Pavements. Reprinted from article by Clyde E. Learned, highway engineer, U. S. Bureau of Public Roads in "Public Roads." 3 ills., 2,400 words. Engineering and Contracting, July 2, Chicago, Ill.

**Bituminous:**

The Asphalt Industry in 1918. Value of all products and amount sold for highway work exceed records of past years. 1 table, 400 words. Good Roads, July 30, New York.

Tar containers. Some container should be adopted that would prevent waste and facilitate getting tar into heater. 100 words. Municipal Journal and Public Works, July 19, New York.

The Application Method of Using Road Asphaltum. Used to best advantage on residential streets and on county and state highways which are not main arteries of travel. 500 words. Pacific Municipalities, July, San Francisco, Cal.

How to Obtain Best Results in Constructing One-Course Bituminous Macadam. Practical details. Reprint of article by F. C. Pillsbury, division engineer, Massachusetts Highway Commission in "Public Roads." 4,000 words. Engineering and Contracting, July 2, Chicago, Ill.

**Brick:**

Tests of Thin-Base Monolithic-Brick Road. Proved a success by recent investigation in Illinois. By Harlan H. Edwards, highway engr., Urbana, Ill. 1 ill., 600 words. Engineering News-Record, July 17, New York.

Review of Recent Progress in Brick Pavement Design and Construction. By C. E. Mandigo, consulting engr., Western Paving Brick Mfrs. Ass'n, Kansas City, Mo. 2 ills., 2,300 words. Municipal and County Engineering, July, Indianapolis, Ind.

**Other Kinds:**

Design and Construction of Granite Block Pavements in Cincinnati. By H. F. Shipley, ass't city engr. in charge of highways, Cincinnati. 6 ills., 2,400 words Municipal and County Engineering, July, Indianapolis, Ind.

Asphalt-Covered Napped-Block Pavement. A pavement being laid in Newark, N. J., replacing an old granite block which is being made smooth by a sand-asphalt surface; long-radius corners and sidewalk replacing. 2,500 words. Municipal Journal and Public Works, June 19, New York.

Stone Macadam Roads. How shall we build them now? Paper before Road School of the Wisconsin Highway Commission, by W. C. Buetow, division engr., Wisconsin Highway Commission. 1 ill., 2,600 words. Good Roads, July 2, New York.

Some Suggested Changes in Concrete Sidewalk Specifications. Elimination of cinder foundation; underdrainage; one-course concrete recommended. By C. E. De Leuw, of Gates & De Leuw, Chicago. 1,000 words. Municipal and County Engineering, July, Indianapolis, Ind.

**Design:**

Influence of Motor Traffic on Road Design. Preliminary studies for designing of main interurban motor transport roads; transportation surveys, laws and regulations, widths, grades, curves, bridges, drainage and foundations, wearing surfaces, detours and other considerations. By A. H. Blanchard, consulting highway engr. 3,500 words. Good Roads, July 23, New York.

Standard Sections of Highways of New Jersey State Highway Department. Brick, concrete and bituminous concrete, various conditions. 10 ills., 1 page. Engineering and Contracting, July 2, Chicago, Ill.

Character and Cost of Highways for Motor Truck Use. Will have concrete foundations, will be not less than 20 feet wide and will cost from $35,000 to $40,000 per mile. By S. Whinery, civil engineer, New York City. Table. 1,700 words. Engineering News-Record, July 10, New York.

Cleveland Underdrains All New Pavements. Methods and advantages of artificially draining the subsoil. By F. R. Williams, paving engr. 2 ills., 1,300 words. American City, July, New York.

Notes on Road Foundations, Drainage and Culverts. Moisture content of subgrade; movement of capillary water; location and size of culverts. By U. W. Christie, Sufferin county engr., Ontario. 2,200 words. Municipal and County Engineering, July, Indianapolis, Ind.

Surveying for Highway Improvement. Future usefulness of roads dependent upon painstaking preliminary work; importance of location; cross-sections. By F. G. Phillips, division engr., Kentucky Dept. of Public Roads. Paper before "Road Builders' Week" of University of Kentucky. 1 ill., 1,100 words. Good Roads, July 9, New York.

**Construction:**

Central Mixing Plant Versus Paving Mixer. Editorial discussion of the advantages and disadvantages of central mixing station. 400 words. Municipal Journal and Public Works, July 12, New York.

How to Get Clean-Cut Grading Jobs. Proper methods in light and heavy work; tractor and grader operation; right machinery and capable men are indispensable. By F. F. Mengel, div. engr., Wisconsin Highway Dept. 2,500 words. Good Roads, July 25, New York.

Road-Construction Problems in West Virginia Mountains. Narrow, curved roads without material storage space. Specially arranged tracks used for hauling. By M. A. Rogers, engineer in charge for McDowell Co., W. Va. 3 ills., 180 words. Engineering News-Record, July 10, New York.

Convict Labor on Highways Good Business. Experiences of highway officials in many states demonstrate efficiency of prison labor on roads and physical, mental and moral benefits accruing to convicts. 4 ills., 2,800 words. Good Roads, July 30, New York.

Convict Labor as Utilized on Arizona Highways. Special handling. Free men for machine operators and foremen. 900 words. Engineering News-Record, July 10, New York.

Unit Price Contracts Vs. Percentage Contracts. Progress dependent upon incentive; unit prices decreasing. Address at meeting of Northwest Ass'n of General Contractors, St. Paul, Minn., by W. L. Darling. 1,500 words. Canadian Engineer, July 10, Toronto, Can.

Guaranties from Contractors. Opinions of courts in various states as to bonds or retained percentages to insure maintenance of pavements; most courts hold them to be guaranties of quality of work only. By J. Simpson. 3,000 words. Municipal Journal and Public Work, July 12, New York.

**Maintenance:**

Macadam and Gravel Road Maintenance. Intelligent and continuous care necessary to conserve the investment represented by highways already improved. Paper before "Road Builders' Week" of University of Kentucky, by R. C. Heath, road engr., Ky. Dept. of Public Roads. 2,000 words. Good Roads, July 9, New York.

Methods of Maintaining Winter Roads in Quebec. Abstract, paper before Canadian Good Roads Congress. By A. Lalonde, assistant engineer, Outremont, Que. 1,300 words. Engineering and Contracting, July 2, Chicago, Ill.

**Miscellaneous:**

A Page of Useful Tables for the Highway Engineer. Quantity of stone in road; area of waterways; earthwork; weights and areas of steel bars. Used by Connecticut State Highway Dept. Engineering and Contracting, July 2, Chicago, Ill.

Practical Hints for the Road Foreman. Abstract from paper before Canadian Good Roads Congress, by Alexander Fraser, assistant chief engineer, dept. of highways, Province of Quebec. 800 words. Engineering Contracting, July 2, Chicago, Ill.

Instruction for Field Inspection of oad Materials Guide for sampling and nspecting materials issued by New Jer-ey state highway dept. 4,000 words. ngineering and Contracting, July 2, hicago, Ill.

Commercial Sizes of Crushed Stone. esults of survey of crushing plant prac-ice conducted in 1918 in five states. Ab-tract of article by F. H. Jackson and W. Mitman, in "Public Roads." 2 ables, 2,000 words. Engineering and ontracting, July 16, Chicago, Ill.

Proposed Tests and Specifications for oad Building Materials. Recommended n the report of the Committee D-4 on oad materials of the American Society or Testing Materials. 2 ills., 2,000 words. uly 2. 1 ill., 2,000 words. July 9. Good oads, New York.

Highways and the Duty of Their uilders. Modern motor truck transpor-ation demands durable all-year roads hat will make profits. By S. M. Will-ams, pres., Highways Industries Ass'n. ills., 1,000 words. Good Roads, July 3, New York.

Hens as Road Builders. Hens to pay ff road bonds by means of the eggs hey lay. Novel idea reported from How-ll county, Mo. 200 words. Municipal ournal and Public Works, July 12, New ork.

Construction Work in New York Last ear. Extracts from the report of First eputy Commissioner Breed on the work f the construction department of the tate Commission of Highways during 918. 1 ill., 2,500 words. Good Roads, uly 9, New York.

Brief Survey of the Road Organization n France. Beneficial effects of surface arring. Paper before the Institution of unicipal and County Engineers at dinburgh, by Lt.-Col. A. Forbes. 6 ills., ,000 words. Journal of the Institution f Municipal and County Engineers, une, London, England.

Comparison of Road Subgrade and Air emperatures. University of Illinois rects thermograph to study variations; hanges in air temperature slow to affect ubsoil. By C. C. Wiley, asso. in civ. ngrg., University of Illinois. 2 ills., ,000 words. Engineering News-Record, uly 17, New York.

## SEWERAGE AND SANITATION

**ewage Treatment:**

The Cantonment Sewage Tanks. Diffi-ulties experienced in operating them, easons therefor in the opinion of sev-ral experts, and means devised for liminating them; sewage of unusual oncentration and high grease content. ills., 3,700 words. Municipal Journal nd Public Works, July 26, New York.

The Doten Sewage Tanks. Editorial iscussion of the difficulties experienced n operating them and the causes; lesson arned. 500 words. Municipal Journal nd Public Works, July 26, New York.

Sludge Utilization. Editorial discus-ion of the successful work done in irmingham, England, in the treatment f sewage sludge, with reference to a aper by J. D. Watson, entitled "The tilization of Sewage Sludge," before he Institution of Municipal and County ngineers. 800 words. Municipal Engi-eering and Sanitary Record, July 10, ondon, England.

Association of Managers of Sewage isposal Works. Papers on the West iding Rivers Board and grease recovery t Huddersfield, England. 1,700 words. unicipal Engineering and Sanitary ecord, July 10, London, England.

Test of Air Diffusers for Activated ludge Process. Abstract of a thesis he basis of which was formed from ests conducted at the University of Illi-ois. Prepared by F. L. Mickle under upervision of Edward Bartow. 1,600 ords. Engineering and Contracting, uly 9, Chicago, Ill.

Efficient Control of Small Sewage orks. Measurement of sewage flow nd sludge; some simple tests. 1,500 ords. Municipal and County Engineer-ng, July, Indianapolis, Ind.

Lake-Water Diversion and Sewage reatment at Chicago. Sanitary district lans compensating works to hold lake evels; sewage treatment to supplement ilution. 600 words. Engineering News-ecord, July 31, New York.

Indianapolis Sewage Purification Plant. escription of up-to-date system to be nstalled; inverted siphon used to con-ey sewage under river. E. C. Hurd, ndianapolis. 1 ill., 1,000 words. Fire nd Water Engineering, July 30, New ork.

Extraction of Grease from Sewage Sludge at Morley. Expenses and receipts of extracting plant. By F. Turner, boro. engr., from the "Surveyor," May 30. 1 ill., 3,200 words. Engineering and Contracting, July 30, Chicago, Ill.

Sewage Treatment Works of Birmingham, England, and Utilization of Sludge. By J. D. Watson, engr., Birmingham Tame and Rea District Drainage Board. From the "Surveyor," July 4. Engineering and Contracting, July 30, Chicago, Ill.

**Sewerage:**

Some Broader Aspects of Rain Intensities in Relation to Storm Sewer Design. Simpson's theory of the thunderstorm; inconstancy of rainfall rates. By R. E. Horton, hydraulic engr., Albany, N. Y. (Concluded.) 11 charts, 6,000 words. Municipal and County Engineering, July, Indianapolis, Ind.

Sewer-Construction Records Used at Scarsdale, N. Y. Daily record blank, rock hook and sample headings from final estimate book used on 22 miles of sewers. By P. Thompson, Yonkers, N. Y. 4 ills., 1,500 words. Engineering News-Record, July 17, New York.

Sewage and Dissolved Oxygen in New York Harbor. No putrefaction in main channels likely during cold months of year; increasing reduction of oxygen in warm months points to growing need for some degree of treatment. 2 ills., 2 tables, 1,400 words. By K. Allen, sanitary engr., Board of Estimate and Apportionment, N. Y. C. Engineering News-Record, July 31, New York.

Sanitation and Municipal Death Rates. Personal precautions, board of health work and sanitation compared; development of municipal sanitation; cost and results. By Geo. A. Soper, Ph. D., paper before Second Pan-American Commercial Conference. 2,500 words. Municipal Journal and Public Works, July 5, New York.

Power of Municipalities to Suppress and Prevent Spread of Contagious and Infectious Diseases. By W. P. Butcher, city attorney of Santa Barbara, Cal. 3,500 words. Pacific Municipalities, July, San Francisco, Cal.

Malaria Caused by Non-drainage of Irrigation Lands. Wet areas due to seepage from irrigation canals result in loss of health and lowering of property values. 800 words. Engineering News-Record, July 31, New York.

Visualizing the Recent Pandemic in Army Camps. Use of spot maps, growing columns and case-and-rate curves for studying progress of influenza and pneumonia in cantonments and other stations. By George A. Soper, major, Sanitary Corps, United States Army. 6 ills., 2,400 words. Engineering News-Record, July 10, New York.

The Private Well and Privy Vault. Can the public afford to tolerate these menaces? The financial side of question; necessity of screening and sterilization where no sewers exist. By R. E. Tracy, director, Bureau of Governmental Research, Indianapolis Chamber of Commerce. 2,000 words. Fire and Water Engineering, July 30, New York.

Conclusions of International Joint Commission on Pollution of Boundary Waters. Pollution can be prevented or remedied without imposing unreasonable burden upon offending communities. 800 words. Engineering and Contracting, July 9, Chicago, Ill.

## WATER SUPPLY.

**Reservoirs:**

Spillway Capacities Required for Reservoirs in Western United States. Based on a study of the flood discharges of 402 North American and 60 European and Indian records, with curves of probable flood discharges for far western streams. By J. T. Whistler, engr.-adviser, Federal Farm Loan Bureau. Charts and tables, 4,500 words. Engineering News-Record, July 3, New York.

Lining a Reservoir with Concrete by the Cement Gun. Costs and progress made, given for operations in irrigation district during current high-price period. By E. Court Eaton, supt. and engr., Lindsay-Strathmore Irrigation Dist., Lindsay, Cal. 2 ills., 1,000 words. Engineering News-Record, July 24, New York.

Need and Cost of Covering the Clear Water Basins of the St. Louis, Mo., Water Works. Organisms present in uncovered reservoirs; types of covers considered. By C. M. Daily, engr., water division, Dept. of Public Utilities, St. Louis. 1 ill., 1,300 words. Municipal and County Engineering, July, Indianapolis, Ind.

Increase of Maine Water Powers Through Regulation. By construction of storage reservoirs the 24-hour service for 60% of year will be increased 12%. 1 table. 400 words. Electrical World, July 12, New York.

**Pipe Lines:**

Another Pipe Bend Failure. 48-inch main broken open at a 45-degree bend at a stream crossing at Wilmington, Del.; described by E. M. Hoopes, Jr., chief engr of the Wilmington Water Dept. 2 ills., 500 words. Municipal Journal and Public Works, July 26, New York.

Flanges for Light Cast Iron Pipe. Investigation of question; proposed standard suggested by American Society of Mechanical Engineers' committee; American Gas Institute flange; proposal that American Water Works Association take matter up with other societies. By J. Knickerbacker, pres., Eddy Valve Co., Troy, N. Y. 1 ill., 800 words. Fire and Water Engineering, July 16, New York.

Diagrams for Excess Loss of Head in Pipe Lines. Losses due to 90-degree bends, increasers, gate valves, reducers and branches readily found; examples given. By F. S. Bailey, ass't engr., Metcalf & Eddy, Boston. 3 charts. 1,200 words. Engineering News-Record, July 24, New York.

Concrete Pipe Fails from Unequal Expansion of Shell. Longitudinal cracks in unreinforced pipe conduit seem due to differential movement because of partial wetness. By G. E. P. Smith, prof. of Irrigation, University of Arizona. 3 ills., 2,000 words. Engineering News-Record, July 17, New York.

Experiences with Metalium Joints in Water Pipe Lines in Davenport, Ia. By T. Healy, Davenport Water Co. 900 words. Municipal and County Engineering, July, Indianapolis, Ind.

Successful Use of Cement Joints for Cast Iron Water and Gas Mains. By S. E. Kieffer, consulting engr., San Francisco. 1,000 words. Municipal and County Engineering, July, Indianapolis, Ind.

Use of Cement Joints for Cast Iron Water and Gas Mains. Successfully used in construction of the U. S. Housing Corporation Project at Vallejo, Cal.; methods of construction used and results obtained. 800 words. Engineering and Contracting, July 9, Chicago, Ill.

Hexagonal Chart for Finding Velocity of Water in Pipes. Single diagram embraces six variable quantities without using a single curve; use of transparent index suggested. By C. W. Anthony, Bahia Blanca, Argentine Republic. 1 ill., 500 words. Engineering News-Record, July 24, New York.

**Pumping:**

Pumping Machinery. Used by the Service of Supply of the American Expeditionary Force in France. 1,500 words. Engineering World, July 1, Chicago, Ill.

Air-Lift Pumping. Demonstrated time and again that air-lift, even with its lower theoretical overall power efficiency, but with immunity from derangement, has been placed ahead of deep-well pumps under many conditions of operation. By John Oliphant, mgr., Air-Lift Pumping Dept., Sullivan Machinery Co., Chicago. 7 ills., 2,500 words. Canadian Engineer, July 10, Toronto, Can.

The "Uniflow" Pumping Engine. Distinct step in advance of other types of reciprocating engines; sketch showing a typical Uniflow steam cylinder and indicator card. Abstract of paper before the American Water Works Ass'n, by D. E. DeCrow, chief engr., Worthington Pump & Machinery Co., Harrison, N. J. 2 ills., 800 words. Engineering and Contracting, July 9, Chicago, Ill.

**Purification:**

Typhoid and Water Disinfection in Maryland. Effect of use of chlorine in 18 supplies, as indicated by typhoid deaths before and after. 2 tables, 500 words. Municipal Journal and Public Works, July 19, New York.

Niagara Falls and Water Chlorination. Method of manufacturing hypochlorite and liquid chlorine; development of apparatus for applying the latter; extent of use. 2,500 words. Municipal Journal and Public Works, July 5, New York.

Chlorination Results in Treatment of Water Supply of London. Super-chlorination and de-chlorination; resistance of various waters to filtration. From "The Engineer," July 4. 2,800 words. Engineering and Contracting, July 30, Chicago, Ill.

Chlorination in West Virginia. Public water supplies of that state which are so treated; results of disinfection in lowering typhoid rates. 2,300 words. Municipal Journal and Public Works, July 12, New York.

Design and Operation of Water Filtration. Plant at Camp Meade, Md. By C. R. Potteiger, Capt., Q.M.C., Camp Meade. 7,000 words. Municipal and County Engineering, July, Indianapolis.

Army Water Purification Units. Motor-driven water trucks for chlorinating and filtering supply for the A. E. F.; experimentation did not affect basic principles of design; description of the unit. By Wm. J. Orchard, sanitary engr., Wallace & Tiernan Co., Inc., N. Y. C. 4 ills., 2,500 words. Fire and Water Engineering, July 23, New York.

Water Testing Stations. Water purification methods accomplished principally with their aid; design and method of construction; the Whiting testing station; results of tests; table of costs. By W. T. McClenahan and R. S. Rankin, engrs., Chicago. 1 ill., 3,000 words. Fire and Water Engineering, July 9, New York.

Point St. Charles Filtration Works, Montreal. Results of first year's operation; efficiencies during last nine months from 96.2% to 99.1% without chlorination, and from 98.1% to 99.8% with chlorination. 8 ills., 3,000 words. Canadian Engineer, July 24, Toronto, Can.

**Waste and Metering:**

Water Waste Control by House Inspections with District Metering. Development of Deacon system; new portable flow meter; periodical remeasurements. From paper before Southwestern Water Works Ass'n, by E. D. Case, vice-pres., Pitometer Co., N. Y. C. 2,500 words. Canadian Engineer, July 24, Toronto, Can.

Water Meters in Milwaukee. 65,072 in service, of which 55,586 were ⅝-inch; in 1918, 14,824 meters were repaired; total cost of operation was $52,675.41. 250 words. Municipal Journal and Public Works, July 5, New York.

Reduction of water consumption in Buffalo. From more than 300 gallons per capita to nearly 200; pitometer survey and house inspection. By G. C. Andrews, water commissioner of Buffalo. Paper before American Water Works Ass'n. 4,000 words. Municipal Journal and Public Works, July 26, New York.

Flat Rate Vs. Meters. Comparison between operating conditions under the two methods of charging for water consumed; flat rate system unjust to consumer; meterage provides best method of checking operations; saving effected by meters. By C. E. Abbott, supt. of water works, Tuscaloosa, Ala. 1,500 words. Fire and Water Engineering, July 2, New York.

Metering and Water Consumption. Problem of water waste, and the elements affecting its elimination; maintenance of meters; importance of complaint bureau; methods of making waste surveys; high bills caused by leakage; centralized management. By H. P. T. Matte, chief sanitary engr., Illinois State Department of Health. 5 ills., 3,200 words. Fire and Water Engineering, July 2, New York.

Reduction of Water Waste by Means of Pitometer Survey and Constant Inspection. Abstract of paper before American Water Works Ass'n, by G. C. Andrews, water commissioner of Buffalo, N. Y. 1,700 words. Engineering and Contracting, July 9, Chicago, Ill.

**Operation:**

Economy Kinks in Water Works Operation in Omaha. H. V. Knouse, superintendent, describes how coal is purchased, alum-cake plant operated and trucks utilized. 500 words. Engineering News-Record, July 3, New York.

Water Works Accounting and Billing. System and methods recently adopted at Milwaukee; accounts on block system; billing machines; no receipts returned. 1,400 words. Municipal Journal and Public Works, July 12, New York.

Free Water. Editorial comment on the practice of cities of giving free water to charitable and religious organizations; better plan to charge all these and have council appropriate funds for paying bills. 200 words. Municipal Journal and Public Works, July 26, New York.

Conclusions of American Water Works Association. Committee of private fire protection service. 1,700 words. Engineering and Contracting, July 9, Chicago, Ill.

Water Rates and Fire Protection Charges. Data from several hundred cities of the United States; maximum and minimum rates; changes since before the war; receipts for public hydrants and private fire protection. 2 pages table, 400 words. Municipal Journal and Public Works, July 19. 2 pages table, 400 words, July 26, New York.

**Miscellaneous:**

Cost of Labor and Material for Construction, Operation and Maintenance of Water Works. Interesting data given by L. Metcalf, of Boston, Mass., in a paper before the American Water Works Ass'n. 2 tables, 1,200 words. Engineering and Contracting, July 9, Chicago, Ill.

Relation of Depreciation to Investment. Has received until recently little consideration from water companies; uniform system of accounting; reproduction cost less depreciation; treatment of amount collected for depreciation; right to return on replacement fund. Paper before Pennsylvania Water Works Ass'n, by W. C. Hawley, chief engr. and general supt., Pa. Water Co. 6,500 words. Canadian Engineer, July 10, Toronto, Canada.

Present Tendencies and Influence of War Period on Public Utility Commission Decisions. Public ownership losing popularity; financial burdens due to war borne by waterworks. Abstract of paper before American Water Works Association, by L. Metcalf, of Metcalf & Eddy, Boston, Mass. 2,500 words. Engineering and Contracting, July 9, Toronto, Canada.

Some Experiences Gained in Private Ownership of Public Water Supply Works at Council Grove, Kan. By L. L. Tribus, of Tribus & Massa, N. Y. C. 1 ill., 2,500 words. Municipal and County Engineering, July, Indianapolis, Ind.

Design and Construction of the Water Supply System of Camp McClellan, Ala. By M. R. Scharff, ass't chief engr. with Morris Knowles, Inc., Pittsburgh. 2,500 words. Municipal and County Engineering, July, Indianapolis, Ind.

The Gravity Water Supplies of Le Roy and Newark, N. Y. Chlorination of supplies; a comparison of costs. By J. P. Wells, consulting engr., Rochester, N. Y. 1 page tables, 2 ills., 2,000 words. American City, July, New York.

Milwaukee Water Works. Average daily consumption during 1918, 62½ million gallons; new intake tunnel. 1,000 words. Municipal Journal and Public Works, July 19, New York.

Water Works Situation at Toronto. Consumption is increasing and additional filtration and pumping capacity may soon be required; works commissioner favors new construction. 1,000 words. Canadian Engineer, July 3, Toronto, Can.

The Gallery Collecting System of the Des Moines, Ia., Water Co. Abstract of an interesting description of this system in a paper before the Iowa Section of the American Water Works Association, by A. T. Luce, engr. and supt. of the Des Moines Water Co. 2 ills., 2,700 words. Engineering and Contracting, July 9, Chicago, Ill.

Artesian Well Supply at Baton Rouge, La. With chart giving relation between yield of wells and lowering of static water levels. By L. R. Howson, ass't engr., Alvord & Burdick, Chicago. 2 ills., 1,400 words. Engineering and Contracting, July 9, Chicago, Ill.

Water Expectancy in Tunnels, Mines and Deep Wells in Homogeneous Rocks. From Journal of American Water Works Ass'n, by R. E. Horton. 1,500 words. Canadian Engineer, July 3, Toronto, Can.

Safeguarding the Water Supply of New York City. Data on available supply; 19 well systems in reserve; 168 square miles in Ridgewood system; Esopus watershed covers 257 square miles. By F. E. Hale, chief chemist, Dept. of Water Supply, Gas and Electricity, N. Y. C. 1 ill., 2,200 words. Engineering World, July 15, Chicago, Ill.

Studies in the Bacteriology of Water. The B. Coli group; the streptococcus group. By Denis B. Wood, from paper before the Institution of Water Engineers. 2,700 words. Engineering and Contracting, July 30, Chicago, Ill.

## LIGHTING AND POWER.

**Lighting:**

The New Street Lighting System in city of Niagara Falls, N. Y. By E. J. Fort, city manager, Niagara Falls. 2 ills., 1,000 words. Pacific Municipalities, July, San Francisco, Cal.

The New Street Lighting System in city of Niagara Falls, N. Y. Expense of maintenance to the city is very small. 2 ills., 900 words. American City, July, New York.

Records of Customers Kept in Columbus, O. Simple, thorough system; forms used to facilitate business. 1 ill., 500 words. Electrical World, July 12, New York.

Service Tests of Small-Capacity Meters. Schedules of tests; experiences as to errors; paper before Ohio Electric Light Ass'n. By A. H. Bryant, meter engr., Cleveland Electric Illuminating Co. 3,800 words. Electrical Review, July 26, Chicago, Ill.

**Power Plants:**

New Kern River Development. Southern California Edison Co. plant has two Francis turbines, operating under head of 800 feet. By G. E. Armstrong, Southern California Edison Co. 3 ills., 2,500 words. Electrical World, July 19, New York.

Practical Operation of Steam Boilers. Useful suggestions for securing efficiency in boiler-room operation given by W. E. Snyder, of the American Steel & Wire Co., in a paper before the Engineering Society of Western Pennsylvania. 3,800 words. Engineering and Contracting, July 9, Chicago, Ill.

Northwest Pennsylvania's Newest Station. Power house has latest ideas of tested engineering practice; built on unit principle; eventual rating, 120,000 k.w. By J. B. Scott, engrg. staff, Day & Zimmerman, Inc. 6 ills., 2,000 words. Electrical World, July 12, New York.

Comparison of Mechanical Stokers. Classification of mechanical stokers; salient features of different stokers; influence of stoker upon draft, combustion chamber, etc. By Robert June, mechanical engr. 4 ills., 2,200 words. Electrical Review, July 19, Chicago, Ill.

The Still Engine: A New Prime Mover. Utilization of fuel and cooling medium features of the engine; high terminal efficiency and low unit of weight are other valuable properties; special applications. 2 ills., 2,000 words. Electrical Review, July 19, Chicago, Ill.

Transmission Line Relay Protection. Review of typical applications of current and directional relays; excerpts from American Institute paper. By D. W. Roper, H. R. Woodrow, O. C. Traver and P. MacGahan. 8 ills., 5,300 words. Electrical Review, July 5, Chicago, Ill.

Selection of Economical Transmission Route. Development of equation and curves which simplify choice between several available routes; balancing extra cost of right-of-way for short route against expense for greater length of ordinary line construction. By P. O. Reyneau, distribution engr., Detroit Edison Co. 1 chart, 2,400 words. Electrical World, July 26, New York.

Assuring Continuity of High-Tension Transmission. Need of good insulators; careful patroling and prompt repairing necessary guard against fires. By John M. Drabelle, mehanical and electrical engr., Ia. Railway & Light Co., Cedar Rapids, Ia. 1,300 words. Electrical World, July 12, New York.

Super-Power Line Is Proposed in Northeast. To connect generating stations at large centers with power and steam at mines; national matter rather than local. 1,000 words. Electrical World, July 12, New York.

**Miscellaneous:**

Central-Station Rates in Theory and Practice. Outline of articles covering whole subject; systems of charging; rate analysis; accuracy of rates; public utilities and public regulation. By H. E. Eisenmenger. 1,400 words. Electrical Review, July 5, Chicago, Ill.

Central-Station Rates in Theory and Practice. First article of series; various kinds of costs; general principles by which service costs can be determined; application to cost of electric service. 5,500 words, July 12. Second article of series; cost analysis of electric service; energy cost and demand cost; some features determining demand cost; load curve and load-factor. 4 ills., 3,500 words, July 19. Third article; capital charges of central stations and how they affect demand cost; interest and depreciation; influence of peak load on expense. 3 ills., 5,300 words. July 26. By H. E. Eisenmenger, Electrical Review, Chicago, Ill.

Electric Light and Power Stations of New York State. An interpretation of items of income, operating expenses, primary power and output as contained in the census report. By S. G. Koon, M.M.E. 1,200 words. Electrical World, July 19, New York.

Some Features of Hydro-Electric Engineering Practice and Possibilities. One development serves 84 cities and towns; advantages and disadvantages of water power. By H. de B. Parsons, consulting engr., N. Y. C. 4,300 words. Municipal and County Engineering, July, Indianapolis, Ind.

Expansion of A. I. E. E. Activities Proposed. Convention of American Institute of Electrical Engineers discussed subjects of transmission, distribution and insulation. 5,500 words. Electrical World, July 5, New York.

A. I. E. E. Convention at Lake Placid. President Adams' address on problems of the day makes co-operation the keynote; technical matters receive their due; features of convention. 1 ill., 7,000 words. Electrical Review, July 5, Chicago, Ill.

## STREET CLEANING AND REFUSE DISPOSAL.

### Refuse Collection:

Refuse Collection in Rochester. Horse-drawn vs. motor vehicles; work methods employed and suggested changes; frequency of collection; amounts of refuse. 1 ill., 2,500 words. Municipal Journal and Public Works, July 5, New York.

Organization for Refuse Collection. Study of operation and efficiency of existing plan at Rochester and recommended organization of "Bureau of Sanitation." 3 ills., 3,000 words. Municipal Journal and Public Works, July 12, New York.

Public Co-Operation in Refuse Collection. Duties and responsibilities of householders not realized by them; should separate refuse and provide suitable receptacles in accessible places. 2 ills., 2,000 words. Municipal Journal and Public Works, July 19, New York.

Cost of Maintaining City-Owned Teams. Data from report of Bureau of Municipal Research, Rochester, N. Y. 1,500 words. Engineering and Contracting, July 2, Chicago, Ill.

Cost of Motor Truck Operation for Refuse Collection. Data from investigation by Bureau of Municipal Research, Rochester, N. Y. 2,500 words. Engineering and Contracting, July 2, Chicago, Ill.

Lower Refuse Collection Wagons. Letter from Arthur E. Peterson, supt., Crematory Division, Spokane, Wash., referring to an editorial in the June 28th issue, and stating what had been done in Spokane after investigation of this problem. 400 words. Municipal Journal and Public Works, July 26, New York.

### Street Sweeping:

Motor Vehicles at Blackpool, England. A gasoline-operated street sweeper is used and six electric vehicles said by the "cleansing superintendent" to have been very successful. 600 words. Municipal Journal and Public Works, July 26, New York.

Motorization of Sweeping Machines. Street department of Albany, N. Y., now using tractors for hauling the sweeping machines. 1 ill., 250 words. Municipal Journal and Public Works, July 5, New York.

### Miscellaneous:

Garbage Disposal by Feeding Successfully Practiced at Lansing, Mich. Collection with motor equipment; some discouraging features. By E. C. W. Schubel, supt. garbage dept., Lansing. 4 ills., 2,200 words. Municipal and County Engineering, July, Indianapolis, Ind.

Institute of Cleansing Superintendents. Suggestions for improvements in apparatus and appliances for dealing with house refuse. Annual Conference at Blackpool, Eng. 2,500 words, July 3. 2,500 words. July 10. Municipal Engineering and Sanitary Record, London, England.

## TRAFFIC AND TRANSPORTATION.

### Motor Truck Transportation:

The Relative Economy of Freight Transport by Railway and by Motor Truck. The light-traffic problem and its relation to public welfare. Highway and railway construction and maintenance costs. Cost of moving traffic by railway and by highway. Road costs and hauling costs combined. Conditions which favor motor-truck operation. Making light traffic railways pay. Business organization of light-traffic railways and of motor truck lines. By Charles Whiting Baker, consulting editor "Engineering News-Record." 19,200 words. Engineering News-Record, July 10, New York.

Hauling Over the Highways with Motor Trucks. Various services performed by vehicles in rural motor express and inter-city hauling; examples and cost data. 14 ills., 2,000 words. Good Roads, July 23, New York.

Uses of the Motor Truck in Highway Work. Road and street contractors and highway departments of states, counties and cities find many and varied uses for trucks and trailers in road construction and maintenance. 8 ills., 1,500 words. Good Roads, July 23, New York.

Haul Gravel with Caterpillar Tractor in Minnesota. Renville county uses a 12-h. p. machine with train of nine wagons; itemized costs. 1 ill., 1 table, 500 words. Engineering News-Record, July 31, New York.

Trailers and Trucks for Highway Hauling. How the trailer solves special haulage problems, reduces road repair and maintenance costs and cuts down cost of highway transportation. By H. W. Wilkin Perry, gen. mgr., Trailer Manufacturers' Ass'n of America. 7 ills., 2,800 words. Good Roads, July 23, New York.

Motor Transportation by the Army. Work of the Motor Transport Corps; trans-continental convoy; national road system a military necessity. By J. M. Riche, lieut.-col., Motor Transport Corps. 2 ills., 1,500 words. Good Roads, July 23, New York.

### Street Railways Finances.

Incentive to Efficiency Is Needed. Fixing of rigid rate of return limits value of service-at-cost franchises. By W. C. Culkins, director of street railroads, Cincinnati. 1,000 words. Electric Railway Journal, July 12, New York.

Burdens from Which We Should Be Relieved. Plea for simplification of regulation, elimination of taxes, free transportation, etc., in order to retain 5-cent fare. Abstract of paper before Central Electric Railway Ass'n, by R. B. Rifenberick, consulting engr., Detroit United Railway. 1,900 words. Electric Railway Journal, July 12, New York.

San Francisco's Municipal Railway Is No Gold Mine. Editorial reference to an editorial in our issue of Feb. 19 and a letter of protest by M. M. O'Shaughnessy, city engineer of San Francisco, in our issue of May 21. 800 words. Engineering and Contracting, July 16, Chicago, Ill.

Has the Municipal Railway of San Francisco Shown Adequate Profit? The 5% true net earnings a poor return on investment considering risks involved. By H. P. Gillette, editor. 2,000 words. Engineering and Contracting, July 16, Chicago, Ill.

Valuation of Electric Railway Properties. Statement filed with Federal Electric Railway Commission and read at Washington July 17. By A. M. Taylor, Philadelphia. 1,000 words. Electric Railway Journal, July 19, New York.

Federal Hearings Commence. Opening hearings before Federal Electric Railways Commission; case of companies; statistics on conditions. 1 ill., 5,500 words. Electric Railway Journal, July 19, New York.

Committee of One Hundred Ready for Hearings. Plans of American Railway Association for presenting its case before Federal Electric Railways Commission. 1,000 words. Electric Railway Journal,

Formal Statements at Washington. Abstracts of written testimony presented by several witnesses at hearings before Federal Electric Railway Commission. Reasons for Railways' Present Condition, by L. S. Storrs, pres., The Connecticut Co., New Haven. Need for Incentive for Economical Operation under Service-at-Cost Franchises, by W. A. Draper, vice-pres., Cincinnati Traction Co. Street Railway Credit and Cost of Capital, by F. H. Sisson, vice-pres., Guaranty Trust Co., N. Y. C. Industry Needs More Than Normal Amount of Capital—Testimony by H. C. Bradlee, of firm of Stone & Webster. Data of the Industry, presented by J. W. Welsh, special engr., American Electric Railway Association. Competition of Motor Vehicles, by L. S. Storrs, pres., The Connecticut Co., New Haven. Taxation of Electric Railways, by C. J. Bullock, prof. of economics, Harvard University. 17 ills., 16,000 words. Electric Railway Journal, July 26, New York.

Washington Hearings Continue. Evidence on railway status of American Election Railway Association presented to Federal Electric Railway Commission by committee of 100. 9 ills., 14,000 words. Electric Railway Journal, July 26, New York.

### Miscellaneous:

The Zone Fare in Practice. (Leeds, England.) Fare increase, 50 to 100%; traffic decrease, 3.4%; revenue increase, 23.3% last year. By Walter Jackson. 9 ills., 4,000 words. Electric Railway Journal, July 12, New York.

To Reduce Traffic Accidents. Highways Transport Committee is conducting a campaign of education, the aim of which is to place basic suggestions as to safety regulations before the municipal authorities of the country. 400 words. Municipal Journal and Public Works, July 12, New York.

Methods of Observing and Analyzing Passenger Traffic. Merits of several methods; helpful advice on use of traffic study data. Abstract of paper before Pa. Street Railway Ass'n, by R. H. Horton, traffic engr., Phila. Rapid Transit Co. 4,500 words. Electric Railway Journal, July 12, New York.

Report on Cleveland Rapid Transit Recommends Street-Car Loop Subways. Consulting engineers find surface relief is first need; street-car loop system at public square should be retained, but capacity increased by placing underground; later rapid-transit system. 4 maps, 2,300 words. Engineering News-Record, July 24, New York.

The Highways Transport Committee in Peace. A description of the organization and work of the committee, with an outline of its plans for the future. By J. S. Cravens, chairman, Highways Transport Committee, Council of National Defense. 2,500 words. Good Roads, July 23, New York.

## FIRE DEPARTMENT.

The International Association of Fire Engineers' Proceedings. Lively discussion of important and timely subjects; the two-platoon system and the gas mask; fire prevention. 10 ills., 38,000 words. Fire and Water Engineering, July 16. Official record of the doings at the annual convention; some reminiscences; fire alarm systems; value of building inspection; the Sears-Roebuck plant fire system. 2 ills., 7,000 words. Fire and Water Engineering, July 23.

The hazard of explosives, ammunition and fireworks considered; ammonia gas dangers and handling of acids. 10 ills., 3,500 words. Fire and Water Engineering, July 30, New York.

Traffic Regulations with Regard to Motor Fire Apparatus. Proper speed for motor fire apparatus and control of general traffic along fire routes. 2 ills., 1,700 words. American City, July, New York.

Pumping Engine Tests. At Electric Park, Kansas City, Mo., during convention of International Association of Fire Engineers; rules of contest; participants. 7 ills., 2,500 words. Fire and Water Engineering, July 9, New York.

Helpful Hints for Fire Apparatus and Truck Operators in Hot Weather. By A. F. Masury, chief engr., International Motor Co. 600 words. Fire and Water Engineering, July 9, New York.

## STRUCTURES AND MATERIALS.

### Concrete:

Proportioning of Pit-Run Gravel for Concrete. Ratio of cement to aggregate constant; physical characteristics of aggregates used; the "sand" method. Paper before the American Society for Testing Materials, by Prof. R. W. Crum, Iowa State College, Ames, Ia. 8 charts, 4 tables, 3,000 words. Canadian Engineer, July 24, Toronto, Can. 1 table, 5 ills., 2,500 words. Engineering and Contracting, July 2, Chicago, Ill. 8 charts, 4 tables, 3,500 words. Concrete, July, Detroit, Mich.

Results of Impact Tests for Determining Wear of Concrete Aggregates. Laboratory tests by New York State Highway Dept. Abstract from paper before Canadian Good Roads Congress by H. Eltinge Breed, consulting engineer. 700 words. Engineering and Contracting, July 2, Chicago, Ill.

Pressing Out Mix Water Adds to Cement Mortar Strength. Tests made with special apparatus permitting pressures up to 30,000 pounds per square inch give high compressive values. By C. T. Wiskocil, ass't prof. civ engrg., University of California. 3 ills., 1,700 words. Engineering News-Record, July 17, New York.

Curing Concrete. Results of tests to determine effect of curing conditions on strength of concrete and wear from abrasion; results much better when concrete is kept damp for several days. 2 ills., 1,400 words. Municipal Journal and Public Works, July 19, New York.

Bulking Effect of Moisture in Sand. With chart giving relation of moisture to volumes of sand; still plenty of room for improvements in methods of mechanical proportioning of aggregates. From article in Canadian Engineer, by Capt. L. N. Edwards. 1 chart, 600 words. Engineering and Contracting, July 23, Chicago.

Bonding New Cement Mortar and Concrete to Old Concrete. Summary of conclusions drawn from tests carried in the Engineering Research Laboratory of the Bureau of Public Roads by W. E. Rosengarten, U. S. highway engineer, in recent publication of Bureau of Public Roads. 1,300 words. Engineering and Contracting, July 23, Chicago, Ill.

Cements Producing Quick-Hardening Concrete. Concrete made with Sorel cement and with calcium-aluminate cements. Paper before American Society for Testing Materials, by P. H. Bates. 4,500 words. Canadian Engineer, July 3, Toronto, Can. 3 tables, 3,500 words. Engineering and Contracting, July 23, Chicago, Ill.

Gravel Aggregate Does Not Make Fire-Resistive Concrete. Report of Committee of Concrete Institute from tests and experience. 1,500 words. Engineering News-Record, July 10, New York.

Preparation of Specifications for Concrete. Practical and advantageous to specify according to strength or any other quality desired; some specifications result in unknown factors of safety. By I. F. Morrison, asst. professor of structural engrg., University of Alberta. 800 words. Canadian Engineer, July 24, Toronto, Can.

**Other Materials:**

Concentrated Load Tests of Yellow Pine Beams for Shear. Recommends 50 per cent increase in previous horizontal shear values used in design. By L. R. Manville and C. R. Hill. 4 ills., 2,300 words. Engineering News-Record, July 10, New York.

Properties of Malleable Cast Iron. Paper before American Society for Testing Materials gives strength data obtained from tests of commercial specimens of material. 6 charts, 1,000 words. Engineering News-Record, July 17, New York.

**Bridges:**

The Placement of the Delaware River Bridge. Description of projected interstate bridge connecting New Jersey and Delaware; preliminary studies; elements of design and reasons for location; traffic census; architectural treatment. By W. P. Laird, prof. of architecture, University of Pennsylvania. 11 ills., 8,000 words. Journal of the Engineers' Club of Philadelphia, June, Philadelphia.

Substructure of Michigan Avenue Bascule Bridge, Chicago. Cylinder piers sunk to rock and hardpan carry large concrete tailpits for double-deck bridge; steel columns embedded in walls support girders for trunnions and uplift anchorage. By H. E. Young and W. A. Mulcahey, engr. of bridge design and engr. of construction, respectively. 4 ills., 2,000 words. Engineering News-Record, July 31, New York.

Test of Sandy Foundations at Arch Bridge Pier. Settlement measured by gauge at top of timber mass passing through completed concrete base. By A. Richards, deputy co. engr., Columbus, O. 2 ills., 1,200 words. Engineering News-Record, July 31, New York.

Highway Bridges and Heavy Trucks. Report to the American Road Builders' Ass'n by its committee on methods of strengthening and reconstrucing highway bridges for heavy motor truck traffic. From Municipal Journal. 2,300 words. Pacific Municipalities, July, San Francisco, Cal.

Problems Encountered in the Design of 12th Street Bridge. Single-leaf span over present channel; double-leaf bridge over new channel; summary of advantages and disadvantages; old and new schemes. By H. E. Young, engr. of bridge design, Chicago. 16 ills., 7,000 words. Engineering World, July 1, Chicago, Ill.

Lightning Pushes Sidewalk Off Concrete Bridge. Accident in Iowa City, Ia. 4 ills., 600 words. Engineering News-Record, July 10, New York.

Strengthening Old Iron Bridges by Reinforced Concrete Arch Ribs. By Maj. A. T. Davis, from "The Surveyor," July 4. 3 ills., 1,400 words. Engineering and Contracting, July 30, Chicago, Ill.

Points Requiring Special Observation and Investigation in Bridge Inspection. Paper before Brooklyn Engineers' Club, by H. C. Keith. 4,000 words. Canadian Engineer, July 17, Toronto, Can.

**Other Structures:**

Pittsburgh South Hills Tunnel and Earlier Projects. Chief features of location and relation to prior projects; approach from city by way of new bridge. 1 map, 1,200 words. Engineering News-Record, July 24, New York.

Proposed Type of Concrete Block for New York Tunnel. 2 ills., 900 words. Concrete, July, Detroit, Mich.

Backfilling Tunnel Through Holes Bored from Surface. Concrete poured around 60-inch cast iron pipe in 10x10-foot rock bore by dropping it 70 feet from trestle across river. By J. Armstrong, division engr., Greater Winnipeg Water Dist., Winnipeg, Man. 2 ills., 1,500 words. Engineering News-Record. July 24, New York.

The Stability of Reinforced Concrete Retaining Walls. With diagram by which solution of final equations is obtained graphically; enables designer to find easily the most economical dimensions of base of the wall. By F. Zimmerman. 66 Hartford street, Dorchester, Mass. 4 diagrams, 2,300 words. Engineering and Contracting, July 23, Chicago, Ill.

Making Concrete Blocks for Toronto Breakwater. New plant located on Toronto Harbor Commissioners' reclaimed dockage at foot of Spadina avenue; pouring concrete blocks weighing 10 and 18 tons, respectively; special design of collapsible wooden forms; economical handling in limited space. By F. Phillips, ass't engr., Roger Miller & Sons, Ltd., Toronto. 3 ills., 800 words. Canadian Engineer, July 10, Toronto, Can.

Friction Tests and Capacity Table for Cement Pipe. Interesting data given in a bulletin prepared by G. E. P. Smith, irrigation engr. of the University of Arizona. 3 tables, 1,400 words. Engineering and Contracting, July 9, Chicago, Ill.

Concrete Railway Track Support. Various types installed on American railways described by A. C. Irwin, engineer of Structural Bureau of the Portland Cement Ass'n, in paper before the American Concrete Institute. 9 ills., 2,000 words. Engineering and Contracting, July 16, Chicago, Ill.

Meeting of American Society for Testing Materials. Society decides on independent headquarters and expands its co-operative work; development in steel and concrete; Marburg memorial meeting. 7,000 words. Engineering News-Record, July 3, New York.

## MISCELLANEOUS.

The Future of the American Association of Engineers. Abstract of presidential address by F. H. Newell at annual convention. 5,000 words. Municipal and County Engineering, July, Indianapolis, Ind.

Institution of Municipal and County Engineers. Annual conference at Birmingham. Arterial roads and town planning, housing policy, refuse and disposal department at Birmingham, England. 2,300 words. Municipal Engineering and Sanitary Record, July 3, London, England.

Engineers and Unions. Editorial discussion of the advantages of a "Union of Engineers" affiliated with the American Federation of Labor, but with its own constitution and own methods of working, which is a future possibility. 700 words. Municipal Journal and Public Works, July 5, New York.

Membership and Functions of Local Engineering Associations. Suggestions for development committee by C. W. Hunt, secretary, American Society of Civil Engineers. 1,400 words. Engineering News-Record, July 10, New York.

New York State Mayors Consider Pressing Problems. Extracts from discussions at the 10th annual conference held in Schenectady. 1,600 words. American City, July, New York.

International Municipal Exposition. Permanent expostion offers great opportunities for manufacturers and affords municipal buyers chance to view most approved apparatus and appliances in their fields. 1 ill., 500 words. Fire and Water Engineering, July 30, New York.

Regional and Town Planning. Summary of problems which must be dealt with in planning a large region; regional planning in Canada. By T. Adams, housing and town planning adviser to the Canadian Government. 2,800 words. American City, July, New York.

The Community Market: Its Benefits and Influence. Utilizing local food products; closer contact of city with country. By E. B. Reid, chief of Division of Information, U. S. Dept. of Agriculture. 2 ills., 2,000 words. American City, July, New York.

Some Fallacious Arguments for Municipal Ownership. Editorial with reference to an article in American Municipalities by G. C. Long, city manager of Webster, Ia., urging municipal ownership of electric light and power plants. 1,800 words. Engineering and Contracting, July 23, Chicago, Ill.

Altoona, Pa., Has Improved Purchasing Bureau. 600 words. Pacific Municipalities, July, San Francisco, Cal.

City Manager Movement Spreading Rapidly. 800 words. Pacific Municipalities, July, San Francisco, Cal.

Co-Operation in Public Service. Public should bear in mind that public servants are their servants. 300 words. Municipal Journal and Public Works, July 19, New York.

Advantages and Disadvantages of Various Methods of Letting Contract Work. By J. A. L. Waddell, consulting engr., Kansas City, Mo. 1 ill., 1,600 words. Engineering and Contracting, July 23, Chicago, Ill.

Suggestions for Improving Specifications. Should be easily read, of convenient size, well indexed and with serviceable covers and binding. By H. G. Payrow, sanitary engr., C. E. Dept., Lehigh University. 1,200 words. Engineering and Contracting, July 9, Chicago, Ill.

Drawing a Picture of Municipal Business. Graphic methods for city officials; map-marking devices; special chart forms; mechanical graphs; appropriation chart; photographing charts. By G. T. Swarts, Jr., C. E. 7 ills., 3,300 words. American City, July, New York.

Moving Three Large Steel Tanks 150 Miles by Water. Due to material and labor scarcity, it was cheaper to move storage tanks intact than to dismantle or build anew. By A. J. Taylor, Taylor Engrg. Co., Ltd., Vancouver, B. C. 4 ills., 800 words. Engineering News- Record, July 31, New York.

The Causes of Erosion of River Banks. Comparison with the bending of a compressed flexible. By Col. Hoc, from "Le Genie Civil," Mar. 15. 9 ills., 2,000 words. Engineering and Contracting, July 30, Chicago, Ill.

Excavation Methods on the Miami Conservancy Project. Some 21 dragline machines at work with buckets from 1-yard to 5-yd. capacity; driven mostly by electric motor. By G. L. Teeple, ass't engr., Miami Conservancy District. 4 ills., 1,500 words. Engineering and Contracting, July 16,Chicago, Ill.

How to Reduce Risks in Earthwork. Adequate plant reduces weather risk; fit plant to job; compare labor costs with machine costs. By H. P. Gillette, editor. 1,700 words. Engineering and Contracting, July 16, Chicago, Ill.

Overhead and Time Cost of Pit and Trench Excavation. By A. P. Roscoe. 900 words. Engineering News-Record, July 10, New York.

British Engineers' Reconstruction Problems. Development of labor-saving machinery and methods and dealing with the labor situation and chief problems of municipal engineers. From the Journal of the Institution of Municipal and County Engineers, by E. J. Elrod, city engr., architect and surveyor, Cardiff, Wales. 2,500 words. Good Roads, July 16, New York.

World Is On Higher Price Level. Maximum not yet reached; prices of building materials likely to increase. By T. S. Holden, investigator Economics Section, Division of Public Works and Constructive Developmenst, U. S. Dept. of Labor. Abstract of testimony submitted to Public Utilities Committee of U. S. Chamber of Commerce. 4,500 words. Engineering and Contracting, July 16, Chicago, Ill.

Municipalities Can Lower Food Prices. Cities offered opportunity by War Department to purchase canned vegetables and meats for sale to their citizens. 200 words. Municipal Journal and Public Works, July 19, New York.

An Unusual War Record. J. W. Dappert, president of the Illinois Society of Engineers, had five sons in army in France and his daughter was in Government service in Washington. 150 words. Municipal Journal and Public Works, June 19, New York.

Harbor Facilities and Development at Houston, Tex. Ship channel converts inland city into ocean port; city provides wharves, freight sheds, warehouse, railway connections and freight-handling machinery; concrete structures. 7 ills., 2,000 words. Engineering News-Record, July 24, New York.

Maximum Temperature in Large Tunnels and Deep Wells with a Trial Empirical Formula. By F. Butavand, from "Le Genie Civil," Mar. 15. 700 words. Engineering and Contracting, July 30, Chicago, Ill.

# NEWS OF THE SOCIETIES

**Aug. 26-28.**—LEAGUE OF CITIES OF THE THIRD CLASS IN PENNSYLVANIA. Twentieth annual convention, Allentown, Pa. Secretary, Fred H. Gates, city clerk, Wilkes-Barre, Pa.

**Aug. 27-29.**—VIRGINIA STATE FIREMEN'S ASSOCIATION. Thirty-third annual meeting, Charlottesville, Va. Secretary, E. K. Landis.

**Sept. 30-Oct. 1-3.**—NEW ENGLAND WATERWORKS ASSOCIATION. Annual meeting, Albany, N. Y. Secretary, Tremont Temple, Boston, Mass.

**Oct. 27-30.**—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, New Orleans, La. Secretary, A. W. Hedrich, 169 Massachusetts ave., Boston, Mass.

**Nov. 12-14.**—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Springfield, Ill.

## American Concrete Institute.

In pre-war times the American Concrete Institute had its annual meeting in February because at that season there is less activity in the concrete field and a larger attendance is possible. Owing to the war, the February, 1918, session was postponed until June, when it was held at Atlantic City at the same time as the annual meeting of the American Society for Testing Materials. This year the Board of Directors considered it inadvisable to attempt another February meeting and therefore announced the meeting with the following program once more to be held at Atlantic City, where, through the cooperation of the officers of the American Society for Testing Materials, meeting there at the same time, one evening's joint session is possible. The other meetings of the Institute were also arranged so as not to conflict with the meetings of the other society, and an open afternoon was left on Friday so as to permit the members of the American Concrete Institute to attend the session of the American Society for Testing Materials at which was discussed the subject of cement.

Especial attention at the June meeting was once more given to the subject of concrete ships. Last year the reports were largely on what was expected to be performed. This year the engineers who have been specializing in concrete ships were able to render reports of what they have done.

The first session was held Friday, June 27, 10 a. m., the following being the program read:

Report of committee on Plain and Reinforced Concrete Sewers, W. W. Horner, chairman; report of committee on Treatment of Concrete Surfaces, J. C. Pearson, chairman; "Effect of Vibration During Placing on Strength of Concrete," D. A. Abrams; "Investigation Into the Economic Possibilities of Light Weight Aggregate in Building Construction," A. W. Stephens; "Result of Investigation on Shear, Impact and Bond Made for Concrete Ship Studies," W. A. Slater.

In the afternoon, the members will heard papers on cement at meeting of American Society for Testing Materials.

In the evening was held the joint session with American Society for Testing Materials. The program was:

Report of A.S.T.M. Committee C-1: On Cement, R. S. Greenman, chairman; report of A.S.T.M. Committee C-9, on Concrete and Concrete Aggregates, Sanford E. Thompson, chairman; report of A.C.I. Committee on Fireproofing, W. A. Hull, chairman; A.C.I. Paper: "Later Fire Tests of Concrete Columns," W. A. Hull; A.C.I. Paper: "The Strainagraph and Its Application to Concrete Ships," F. R. MacMillan; A.S.T.M. Paper: "Effect of Fineness of Cement," D. A. Abrams; A.S.T.M. Paper: "Cements Producing Quick Hardening Concretes," P. H. Bates.

The papers at the third session Saturday morning included: Report of committee on Reinforced Concrete and Building Laws, E. J. Moore, chairman; report of subcommittee on Regulation for Strength Tests of Floors; "Plasticity and Temperature Deformation in Concrete," S. C. Hollister; report of committee on Reinforced-Concrete Highway Bridges and Culverts, A. B. Cohen, chairman.

In the afternoon were presented:

Report of committee on Concrete Roads and Pavements, H. E. Breed, chairman; Papers on Fuel Oil Tanks: Design, H. B. Andrews; Construction, H. E. Walton; Tests, J. C. Jearson; report of committee on Concrete Sidewalks and Floors, J. E. Freeman, chairman; report of committee on Nomenclature, W. A. Slater, chairman.

The Saturday evening session dealt with concrete ships.

The committee on Concrete Sewers submitted for the second time its specifications for monolithic concrete sewers and added specifications for reinforced concrete pipe sewers. The convention again returned the specifications to the committee for revision. In general, the disapproval was due to the fact that there were too many pricely contract provisions. The elimination of limestone as an aggregate was also opposed.

The Committee on Fireproofing submitted a summary of the results of recent tests on the fire resistance of concrete columns, including the paper by W. A. Hull, at the present and at last year's convention, describing tests at the Bureau of Standards, and other actual conflagration tests. The results strongly condemn gravel aggregate for fire resistance. The Committee on Nomenclature submitted some definitions and that on Roads and Pavements some revisions of the recommended practice. As these revisions were not submitted to the membership before the convention, they will not go to letter ballot but are to be printed for reference and possible action next year. They related mainly to consistency and surface finish. The Committee on Reinforced Concrete Highway Bridges and Culverts, under the new chairmanship of A. B. Cohen, of the Lackawanna Railroad, has begun work on an ambitious program toward the preparation of standard specifications for concrete highway bridges. This contemplates recommended practice on details of design, assumptions in design, general specification of materials and performance of work and methods of construction, the latter to be revised from year to year with new developments.

Two years ago the Committee on Reinforced Concrete and Building Laws presented some proposed standard building regulations for the use of reinforced concrete, which in some respects differ from the provisions of the then new "final" report of the joint Committee on Concrete and Reinforced Concrete, of which the American Concrete Institute is a member. The A. C. I. committee this year brought in a revision of these building regulations. Four medals were awarded. One of these was a special medal struck off for the institute and awarded to W. Leslie Comyn, of San Francisco, Cal., for, to quote the medal, "his faith and courage in building the first American ocean-going concrete steamship," the "Faith." The others were the Wason medals, the gift of past president Leonard C. Wason, of Boston, for the most meritorious paper presented to the institute in the year. On account of the war, the award has never been made, so three were awarded this year: for 1916, to Prof. A. B. McDaniel, for his paper, "The Effect of Temperature on the Strength of Concrete;" for 1917, to Maj. Charles W. Gow, for his paper, "The History and Present Status of the Concrete Pile Industry," and for 1918, to Prof. Duff A. Abrams, for his paper, "Effect of Time of Mixing on the Strength and Wear of Concrete."

Practically the same officers have been continued for the ensuing year, with Prof. W. K. Hatt, of Purdue University, as president. It was announced that next February the institute would return to its regular practice, broken during the war, of holding its convention in the winter, and would meet in Chicago.

## American Association of Engineers.

In response to an insistent demand from engineers in the past for the American Association of Engineers to open an office in New York, a secretary has been appointed for the New York chapter. Temporary headquarters will be at 50 Church street, and the permanent adress will be announced later.

*(Continued on page 100.)*

# NEW APPLIANCES

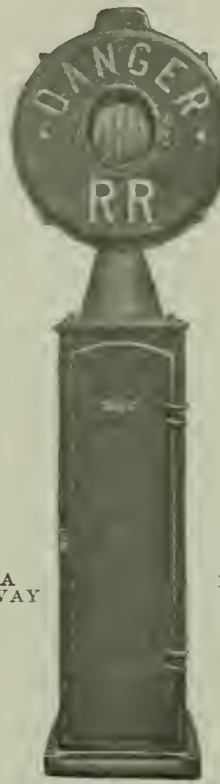
**Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.**

## A G A HIGHWAY DANGER SIGNAL.

### New Type Adapted to State Sign Regulations.

A new A G A highway danger signal designed on the same principles as the old one, already described in these pages, has been developed. The essential feature of the new type is that it conforms more nearly with the requirements as to shape and other characteristics of road signs authorized by the state legislatures.

The whole sign is made of cast iron and consists essentially of a round lamp box 30 inches in diameter. In the face of the sign are transparent letters and in the center a red 8⅜ inch spread light lens through which at night an acetylene light flashes a red warning signal and at the same time illuminates the transparent letters on the sign with sharp distinctive flashes. The lamp box is mounted on a housing containing the gas cylinder, pressure gauge, pressure regulator and necessary piping. The face of the lamp box is painted red, the transparent letters are white and the rest of the sign is black. Lettering on the sign can be altered to meet requirements. The center of the lens is 6½ feet above the top of the concrete pedestal on which it stands. The pedestal can be made of any height desired.



A G A HIGHWAY DANGER SIGNAL

The flasher in the signal designed for railway and highway work is on the same principle as the large A G A Flasher used by the United States Government for lighthouses and buoys. The flasher is set for light characteristics most suitable for the work, 1/10 light period and 9/10 dark period and 60 flashes per minute. The number of flashes per minute, however, can be increased or decreased as desired. The signal operating continuously day and night consumes 0.8 cubic feet of gas per 24 hours and the 12 inch by 36 inch cylinder within the housing contains enough gas to operate the sign for eight months. The sign can be made with a single or double face as required and can be used for an advance warning to dangerous railway crossings or for bad curves and steep grades in highways.

The signal, which is shown in the accompanying illustration, is made by the A G A Railway & Signal Company, Elizabeth, N. J.

## PERSONALS

Emerson, Frank C., has been appointed state engineer of Wyoming. For the past 15 years Mr. Emerson has been in charge of large irrigation enterprises in that state. At the time of becoming state engineer, in addition to a general consulting practice, he was superintendent of the Big Horn Canal Association and the Lower Hanover Canal Association, with headquarters at Worland, Wyo.

Bair, M. B., who formerly was principal assistant engineer of the division of sanitary engineering, Ohio State Department of Health, has been appointed chief engineer of the bureau of sanitation of the Arkansas State Board of Health, with offices in the state capitol at Little Rock.

Buck, Capt. W. V., of the 23rd Engineers, U. S. A., has been appointed assistant state highway engineer of Kansas. Before entering the service Mr. Buck was in charge of the construction work of A. Jaicks Co., general paving contractors, Kansas City, Mo.

Hubbard Prevost has resigned as chief of the Division of Tests and Research of th eUnited States Bureau of Public Roads to accept the position of chemical engineer for The Asphalt Association. In his new position he will direct the technical and research work of the association and will cooperate to the fullest posible extent with public officials, engineers, contractors and others interested in highway construction and the use of asphalt for various purposes.

## INDUSTRIAL NEWS

**The Sullivan Machinery Company,** Chicago, Ill., announces that Phillips F. Jarvis has resigned his position as sales manager for the territory controlled from the St. Louis office. The following appointments are announced: Marion C. Mitchell has been appointed sales manager for the territory in Indiana and Illinois, previously controlled from the St. Louis office, with temporary headquarters at room No. 2006 Railway Exchange, St. Louis. Don M. Sutor, formerly manager or the El Paso office, has been appointed sales manager for the territory of western Kentucky, western Tennessee, Missouri, Arkansas, Oklahoma and Kansas (except the oil territory), with headquarters at room No. 2006 Railway Exchange, St. Louis. Daniel H. Hunter has been appointed sales manager for Louisiana, Texas (except the southwestern section), and the oil fields of Oklahoma and Kansas, with headquarters in Dallas, Texas.

## NEWS OF THE SOCIETIES

*(Continued from page 99.)*

Kay B. Knudsen, the new secretary, was born in Chicago. He graduated from Cooper Union, New York, in 1911. About four and a half years of his experience has been on railroad work, two years on sanitary and municipal work, and one and a half years on building and construction, subway construction, and drainage work. In July, 1918, he entered military service; was promoted from the ranks to be second lieutenant, engineers, in October, after a short period of training at the E. P. T. S., and was discharged in December. For the past six months he has been employed as principal assistant engineer in the office of Alexander Potter, consulting engineer, New York.

The Oregon Society of Engineers unanimously voted at its meeting on July 24 to amalgamate with the American Association of Engineers. Other societies that expect to vote upon amalgamation in the near future are The Engineers' Club of Kansas City, The Engineers' and Architects' Association of Southern California, the Southwestern Society of Engineers and the Houston Engineers' Club. The question of amalgamation with A. A. E. has been initiated by several other societies.

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City County State

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## MORE ENGINEERS ORGANIZING.

The president of Queens Borough, New York, is reported to have refused to deal with a committee of Local No. 10,388, Union of Technical Men, which is affiliated with the American Federation of Labor and includes city engineers, surveyors and draughtsmen, which committee has demanded a general wage increase of $500 a year for every member; saying: "One might as well contemplate a labor union of doctors, lawyers and clergymen."

But startling as it may seem to many, and not least to the engineers themselves, it is apparent that a large proportion of the engineers who work on a wage (as distinguished from a fee) basis are attaching themselves to the A. F. of L. or to the more conservative American Association of Engineers, being urged and almost compelled to this by the development in social conditions since the beginning of the war.

## MUNICIPAL BOND BOOM.

During July municipal bonds sold to an amount only once before surpassed or even approached for that month; and the total sale for the first seven months of this year has never before been approximated during a similar period. This includes both state and city borrowing, and is based upon figures reported by the Daily Bond Buyer. The figures given are $69,696,480 for July and $378,123,922 for the seven months January to July. The highest previous figure for these seven months was $349,082,007, in 1914. If the sales follow the precedent of previous years they will continue high during August, and then fall off until the end of the year.

## HIGHWAYS AS FEEDERS.

During the war much was said concerning the need of motor truck hauling to supplement the railway hauling of freight between transportation centers. Last month the Highways Transport Committee of the Council of National Defense stated a policy that seemed to imply its belief that such emergency has passed and with it the desirability of such motor traffic. The policy was stated in the following words:

> The Highways Transport Committee of the Council of National Defense believes that, in order to promote the best results in the increase of the value of land, the increase of production, the increase of distribution of merchandise and commodities, that adequate highway transportation should be provided through territories not served by rail, electric or water transportation.
>
> The committee appreciates the fact that commercial highway transportation on any of the main traveled highways of the country is valuable in that it provides connection between large industrial centers, and in providing that transportation which is necessary to the health, comfort

and pleasure of the community. Yet the committee believes that such transportation is of questionable value in the encouragement of commerce when running immediately adjacent to rail and waterways between terminals and therefore presumably in direct competition with such facilities.

The committee recognizes the economic disadvantage suffered by the individual producer who lives at a distance from adequate available transportation facilities and the committee also believes that development of the country will be far more rapid when there is efficient rail or other transportation in territories not so supplied at the present time.

In other words, the committee is becoming more and more convinced that the development of efficient rail, electric and water facilities is dependent upon the establishment of highway transportation facilities in territories such as will prove complementary to such rail, electric and waterways systems instead of competing with them.

As a general statement, we believe that the above reasoning is sound. Taking into account all costs, including that of the highways themselves, there can be no question that rail or water transportation is very much cheaper than that by motor vehicles; and with public regulations of rates, the cost to the public is unquestionably less, in the long run.

There are exceptions to this, however, as during emergencies of sudden or temporary great enlargements of traffic demands that can not be met quickly by increase in rail facilities or that are of such brief duration that such increase would not pay. Also there are certain classes of materials that it is preferable to haul direct from shipper to purchaser, without rehandling at rail terminals, even at increased cost; such as frail materials, household furnishings carried direct from former to future residence of owner, etc.

In general, however, the committee is undoubtedly correct, and the funds, materials and energies used in increasing the mileage of good roads should be devoted more to the feeder roads leading out into districts not now served by railroads than to those directly paralleling railroads.

# THE NEW LONDON HOUSING PROJECT

## General Plan of Procedure in Carrying Out the Project, Involving a Million and a Quarter Dollars.—Solving Some Grade Problems—Street Making Over Mucky Land—Other Special Features.

By LOUIS L. TRIBUS.*

Several generations had been attempting to instill into the public mind the worth of money; efficiency experts had tried to show where fractions of cents could be saved; business men from small to great endeavored to rub a little more metal off each dollar and the wastes of earlier years had been turned over to secure the remaining values.

And then came the world war, with its countless problems. Result, an unprecedented demand, with haste as the controlling factor and money of little object.

Prior to war days, private capital built new domiciles for workmen in the United States to an aggregate annual value not far from one billion dollars. The war, while tremendously increasing the demand, practically ended such investments.

Manufacturers had to scrape together all possible moneys to turn out war products, so could not spare any for house erection. Big pay, however, caused workers to seek better quarters. Obligingly, Uncle Sam rose to the occasion, and through the War Department huge cantonments were built for the soldiers, and by the Emergency Fleet and U. S. Housing Corporations thousands of houses had been erected, and many other thousands were contemplated, when the welcome armistice was signed. War fervor and enthusiasm rapidly abated, munitions and supplies were no longer in demand, overtime work was not needed, and stock taking has begun. Yet houses are more than ever required in large numbers, for approximately one hundred million dollars expended in the Government projects could only meet at best a fraction of the normal demand.

What will Uncle Sam do as a builder and landlord? Will he treat the housing proposition on a common-sense business basis, or will he follow many unfortunate precedents and sell out for a small fraction of the cost, leaving speculators, favored and unfavored, to make handsome profits thereby? Recent congressional action indicates the hope for wise action.

In July, 1918, the United States Housing Corporation was organized under a New York Charter, a bureau of the Department of Labor holding all the stock. Otto M. Eidlitz served as its first president and active manager, succeeded in order by J. W. Alvord and L. K. Sherman, each previously acting as chief engineer.

Among petitions receiving early consideration were those from New London and Groton, Conn. The New London Ship and Engine Co., The Groton Iron Works, the Navy Department's submarine base and general Naval establishments, and other local industries, public and

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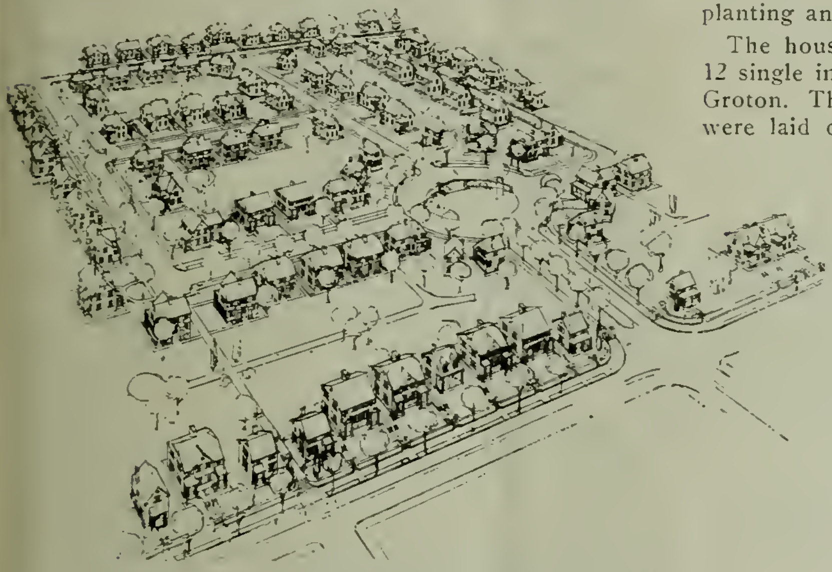
*Of Tribus & Massa, consulting engineers, New York City.

LOOKING FROM JEFFERSON STREET THROUGH THE MAIN ENTRANCE UP LINCOLIN AVENUE.

private, all employed skilled workers in large numbers, yet possessed very inadequate facilities for housing them.

As soon as decision was made to grant the requests, a committee was selected to design and handle the project, each member attending to his own phase of the work, but all acting in consultation so that an harmonious whole might be expeditiously consummated. New York men were selected, Hoppin & Koen as architects, Chas, N. Lowrie as town planner (or landscape architect), and Tribus & Massa as engineers.

The first conferences were held about the end of June, 1918. Before the close of September, land had been selected and surveyed (boundary and topographic); and complete layout and building plans, specifications and estimates had been prepared and approved. On October 9 work was begun by the H. P. Cummings Construction Co. of Ware, Mass., which took the whole contract, subletting the Groton portion to J. Taylor Douglass of New London. Typical Connecticut rocky farm lands were purchased, well dotted with boulders and some ledge, virgin territory for city development.



SKETCH OF NEW LONDON PROJECT AS DESIGNED.

This plan was carried out except for a few of the houses. The street along the foreground of the sketch is Jefferson avenue. The passageway up from this along the left, for pedestrians only, contains the alternating steps and inclines shown on one of other illustrations.

At Groton, the streets and utilities were already in process of installation by the private owners, a number of whose vacant lots the U. S. S. Housing Corporation purchased.

In New London complex agreements had to be made with the city departments, covering mutual proportion of payments vs. assessments, for sewers, water mains and services, street pavements, curbs, gutters, sidewalks and street lighting; and with the utility corporations for gas, electricity and telephone service and their distribution by pipe and wire. These arrangements in all essentials were made by the engineers, though the legal department carried them to final ratification. The city's public water supply had to be connected up for domestic and fire service, and the city's sewers, sanitary and storm, provided outlets for the project's system.

The general plan of procedure was as follows: The engineers made the basic topographic and boundary surveys and borings for sub-surface information. The town planner studied out property grading, street systems (plans and profiles), location of houses and of street lights, shrub and tree planting, etc. The architects designed the houses (some ten types). The engineers designed the utilities, sewers (sanitary, land and storm), water mains, pavements, etc.; laid out all work (including buildings), and supervised all construction, except planting and building erection.

The houses actually erected numbered 52 double and 12 single in New London, and 9 double and 7 single in Groton. The property and public utilities in New London were laid out to accommodate 22 other double and 3 single houses, though full frontage improvements were not carried out for them.

The cost for land, grading, street improvements, houses actually erected, and all overhead will be not far from $1,200,000; or, averaged for only the 141 families served, equals a total of $8,500 per residence. The double houses are so constructed that ownership can readily be divided and each part retain its own abundant land and all conveniences. If the balance of the houses planned had been built, the extra cost for construction and all facilities would scarcely have exceeded $150,000, which would have brought the average for the whole project down to about $7,200 per family. Allowing the Government's conceded 25 per cent excess cost for war-time conditions, in its partly determined scheme of sale, would make the houses with their very complete facilities and surroundings a very reasonable and creditable investment at $5,400. While the plots differ largely in shape and area, something over 3,000 sq. ft. average is alloted for each family. The difference in shape, size and position of lots and houses makes a very attractive variation for possible purchasers.

So far as special construction goes, there was no marked novelty, except the fact that lumber for the houses was all cut in the mill at the site, so that carpenters had little to do but assemble the numbered pieces and nail them in place.

CONTINUATION OF VIEW ON OPPOSITE PAGE.

STEPS FROM JEFFERSON AVENUE TO COLVER STREET.

All houses have full-height cellars, with concrete or rubble walls, slate roofs, theoretically fireproof stop walls, hot air heating, gas hot water supply and ranges, electric lighting, bathrooms, double floors, and are plastered, painted, stained and papered. Each family has a separate concrete approach sidewalk and walk to the back door.

As the layout partially fronts on one of the main streets of New London, a handsome rubble retaining wall was built the whole street length, both for artistic effect and to better the gradient for the properties fronting upon it, as the land sloped up rapidly. Also, the hillside was cut down nearly level for some 25 or 30 feet back of the houses to give yard room; a bank with a slope of one to one being formed at the rear and protected by seeding and honeysuckle-vine planting. At the top edge of the slope a turf gutter was shaped, having several turfed down-chutes for storm water. At foot of the slope another turfed gutter carries the flow to an outlet tile reaching the main street.

This hillside also gave opportunity for a rather artistic and convenient foot access by steps and inclines to connect the low-level and high-level streets. (See photograph.)

The property was so laid out that at present driving access is quite feasible by way of a brick-paved, boulevarded wide street. Ultimately the rear (west) of the property will be connected to a main north and south thoroughfare.

The brick used for this embellished entrance street is laid on a 6-inch concrete foundation and is of the wire-cut lug hillside type placed longitudinally. Two cross grooves on each brick, breaking lines in laying, give specially good footing in connection with the joints and the pavement presents rather of a novel general appearance as of brick standing on end. As yet, little of this type of paving brick has been used, though it promises well.

The other pavements on the project have 2½-inch crushed granite (from the property) for first course, treated with asphalt (penetration); and the upper layer is of 1-inch broken trap rock from near New Haven, covered with a lighter coat of asphalt, and this in turn coated with granite screenings.

A considerable portion of the storm flow collected from the whole area is taken underground. The balance is conducted by concrete and brick gutters to the lower level main street. A number of acres of the original plot were occupied by a shallow pond and swamp. Ditching relieved the surface conditions, and deep tile underdrainage sufficed for draining most of the property; but under the streets quite an area of black muck was excavated to a depth of 5 to 8 feet. This muck, sweetened with lime and partially mixed with lighter soil, has made a splendid top dressing for the whole property. It was replaced by material from excavations which was better fitted for supporting roads and traffic.

Most of the householders can maintain motor cars if they desire, and use in common, for access to their back yards, the two adjoining concrete entrance sidewalks as runways. Two groups of houses are given special access to the rear of their lots by paved service roads, narrow but still suitable. The corporation built no garages, leaving such luxuries to the individual tenants or owners.

All plots are set out with barberry front hedges, shrubs and vines; and each house even has a folding, umbrella type, clothes line outfit. The streets are lined with well grown young trees.

Electric service wires (light and telephone) come from the rear, so as to avoid poles on the streets except those needed for street lamps.

Monolithic concrete curbs and gutters edge the paved roadways, and turf fills the remaining street space not occupied by sidewalks.

The contract was executed under the direction of a works superintendent, W. F. McCulloch, for most of the time, and Walter C. Brennan for the closing weeks, aided in consultation by the original committee and its resident representatives, but all the time under direct orders from Washington, and being frequently inspected by traveling representatives of the appropriate corporation divisions. Many changes occurred in the operating personnel of the corporation at Washington, but there has been practically no friction from start to finish.

Had it been possible to secure for every one of the forty or fifty projects the most competent and experienced technical and construction men, so many supervisors would have been unnecessary, but under all circumstances it probably worked out to ultimate advantage, even though at times it approached an illustration of the old adage, "Too many cooks, etc."

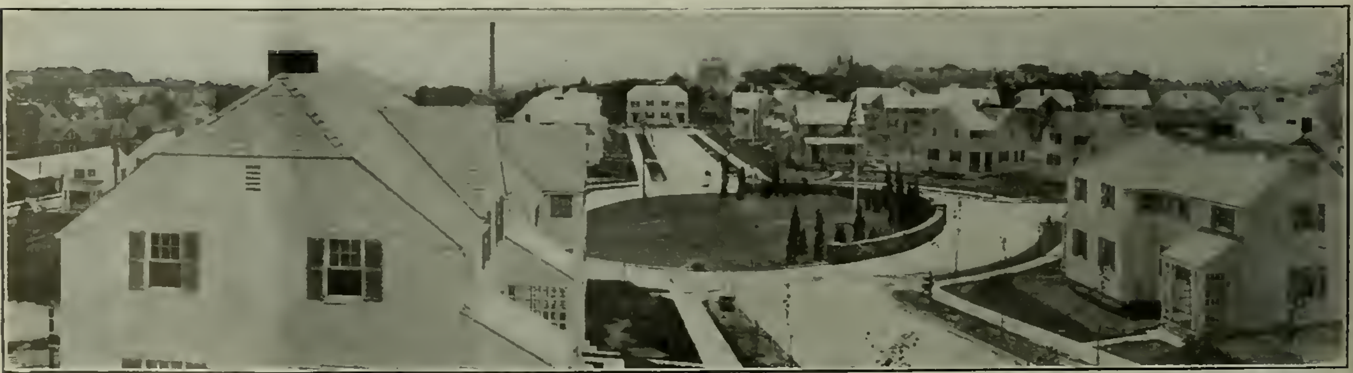
The only severe criticism justly to be made arose out of the war, during and subsequent to its close, in the relationship to "Labor." Practically every demand and even whim or request was yielded to, at the expense of the public purse in most instances.

The very complete development, artistic placing, attractive cottages and pleasing color scheme, will, when trees and shrubs have had time to grow a little, make Uncle Sam's New London project a worthy one.

The Groton project, covering only the erection of comfortable cottages, sandwiched with others on streets already opened. possessed no feature for special description.

## WATER POWER IN MAINE.

According to the Maine Public Utilities Commission, there is now available at developed sites in that state 226,560 h. p., based on low water flow of the streams and



LOOKING SOUTHWEST FROM THE NORTH SIDE OF THE PROJECT.
Low buildings at extreme left are the offices of those in charge of the project.

available 95 per cent of the average year; and at undeveloped sites 143,496 h. p., on the same basis. Or, considering the power that is available for 24-hour service during the 60 per cent of the time when more water is flowing, that at developed sites is 391,113 and that at undeveloped 267,155 h. p. This shows that about 59 per cent of the available power of the rivers of the state has already been developed—a high percentage considering how large an area of the state is very thinly settled.

The commission also estimates that, by the development of available sites and storage reservoirs, the power at developed sites may be increased 36 per cent on the low water basis, or 12 per cent on the basis of use for 60 per cent of the year; while at undeveloped sites the available power may be increased 65 per cent on the low water basis, and 22½ per cent on the other basis.

# CAN THE CONTRACTOR ASSIGN HIS CONTRACT?

### Legal Decisions Setting Forth Conditions Under Which Contracts for Municipal Improvements Can Be Assigned.

By J. SIMPSON.

Contracts for public improvements may be assigned by the contractor provided that is not forbidden by the contract itself or by a state statute or municipal ordinance, and provided that due notice is given to the municipality and its assent is obtained. Sims v. Hines, 121 Ind. 534, 23 N. E. 515; Taber v. Grafmiller, 109 Ind. 66 (street improvements); St. Louis v. Clemens, 42 Mo. 69 (grading, curbing and macadamizing a street); Ernst v. Kunkle, 5 Ohio St. 520 (same); Taylor v. Palmer, 31 Cal. 240

When there is nothing in the contract restricting the right of a contractor to transfer his contract to another party, there is no law, in the absence of a state statute on the subject and of any objection on the part of the city, to prevent such a transfer. The transfer may be in parol, and needs no writing to effectuate it. Of course, if the transfer is made on specified conditions, the transferee takes it subject to these conditions. McCubbin v. City of Atchison, 12 Kan. 166.

One reason given for the rule that such contracts are assignable is that they are not of a class which stipulate for the personal services, knowledge, skill and experience of another. They are for work which may be done as well by a third person as by the contractor himself in person. St. Louis v. Clemens, 42 Mo. 69.

The United States Supreme Court makes the distinction (Delaware County v. Diebold Safe Co., 133 U. S. 473, 494) between contracts, such as for work upon street, held, from the nature of the subject, to imply no personal confidence in the contractor, and so to be assignable, and those where the personal care and skill of the contractor is necessarily relied on and so, to that extent, at least, held to be unassignable. See also Burck v. Taylor, 152 U. S. 634.

CONTINUATION OF VIEW ON OPPOSITE PAGE.
All photographs were taken July 29, 1919.

A contract for the construction of a bridge was entered into with a city, which had a bond with sureties for the due performance of the work by the contractor. During the progress of the work, the contractor assigned the contract without the city's consent, and renounced all interest in it and refused to go on with the work. It was held. Pike v. City of Waltham, 168 Mass. 581, that the city had a right to refuse to allow the assignee to go on with the work. If the assignee had undertaken and completed the work as the agent of the original contractor, the contract would have been properly performed.

On the same principle, Devlin v. New York, 63 N. Y. 8, it was held that the assignment by the contractor of a contract with a municipal corporation for work (in this instance street cleaning) is not against public policy so long as the corporation retains the personal obligation of the original contractor and his sureties and in the absence of anything prohibiting it in the statute authorizing the work, such an assignment is valid. It does not terminate the contract or authorize the corporation to repudiate it.

There is no doubt that assignments of claims arising out of such contracts, that is, of money due or to become due under the contracts, are valid and enforceable. Gordon v. Jefferson City, 111 Mo. App. 23, 85 S. W. 617; Diggins v. Hartshorne, 108 Cal. 154; Bernstein v. Downs, 112 Cal. 197; Hall v. Buffalo, 1 Reyes (N. Y.) 196; Parker v. Syracuse, 31 N. Y. 376; Herman v. Oconto, 100 Wis. 391; Brackett v. Blake, 7 Metc. (Mass) 335.

It is held in some cases that there is a wide distinction between the assignment of a contract and the assignment of moneys falling due thereunder after performance. Where a city has breached the contract, the contractor would become entitled to receive the sums of money which had been earned thereunder, and to recover for such damages as might have been occasioned by the breach. An assignment, therefore, of these claims would not be an assignment of the contract, but of a cause of action against the city for the recovery of moneys which it was obligated to pay; and, in this view of the question, there would be no violation of a clause in the contract prohibiting its assignment with the city's consent. Such a clause is in these cases held to be a restriction solely upon the assignment of the contract, as such, and not of the moneys earned thereunder, which the city is bound to pay. Such an assignment is not an assignment of the contract. Brace v. City of Gloversville, 167 N. Y. 452, 60 N. E. 779; Snyder v. City of New York, 77 N. Y. Supp. 637.

It is well settled that a contract may be assigned so as to vest in the assignee the equitable right to the proceeds, although the money may not have been due or earned at the time of the assignment. It is often done by builders and other contractors to enable them to procure the materials necessary to fulfil their contracts. The fact that the debtor is a municipal corporation does not change the right to assign money not yet earned. Philadelphia v. Lockhardt, 73 Pa. St. 211.

The case, however, may be different where the assignment is only of a part of the claim against the municipality, and the municipality has not assented to the severance of its liability. In Cook v. City of Menasha, 103 Wis. 6, an order on the city by a paving contractor to material men for material furnished by them was held unenforceable, because it did not amount to an assignment of the whole of the contractor's claim against the city, and the Wisconsin Supreme Court holds that "an assignment by a creditor of a portion of his claim is not binding on the debtor, unless he assents to such severance of his liability."

The municipality may waive its right to contest the validity of an assignment by recognizing the assignment, by dealing with the assignee or otherwise, or accepting the benefit of work done under the assignment. In City of Dunkirk v. Wallace, 19 Ind. App. 298, it was held that in an action by an assignee of a contract for breach thereof, it was immaterial that there was no averment that contract was by its terms assignable, or could be sublet, the city having had knowledge that the assignee was making the improvement under the contract, made no objection thereto, and acquiesced therein.

A building contract with a city provided that the contractor should not subcontract any part of the work without the architect's consent. When the contract was made, the contractor informed the board that a subcontractor, then present, would do the carpenter work, and neither the board nor the architect made any objection. No objection was made to the subcontract until the subcontractor sued to enforce a lien for work done. It was held, Ocorr v. City of Little Falls, 79 N. Y. Supp. 251, 77 App. Div. 592, affirmed 178 N. Y. 662, that the consent of the architect was in effect given as required; but, if it was not, the city, having with full knowledge of the facts, accepted the benefit of the work done and materials furnished, was not in a position to urge the invalidity of the subcontract.

Contracts for the construction of sewers were sublet with the written consent of the city, and the subcontractors fully performed the work thereunder. Thereafter the original contractor assigned the contracts to the subcontractors, without the city's knowledge or assent. It was held that the assignment was valid and entitled the subcontractors to maintain an action for extra work done under the contracts, though the city did not know of or consent to the assignment. Hanrahan v. City of Janesville, 145 Wis. 457, 120 N. W. 482.

A city, to take advantage of a clause in a contract against assignment without consent in an action on the contract, must plead it as a defense in its answer. Episcopo v. New York, 72 N. Y. Supp. 140.

A clause prohibiting assignment without consent of the city, though it would be available as a defense to the city to any claim made against it by an assignee of the contract, is not available against a claim, not made against the city, but against the reserve fund payable under the contract. If that fund did not belong to the city, as was held, it was a matter of no concern to it what parties were held to be entitled to receive it. Episcopo v. New York, 72 N. Y. Supp. 140. The sole purpose of a clause in a contract prohibiting assignment without consent of the city is for the city's protection, and to secure for it the skill and experience of the person contracted with, and not the protection of outside parties; therefore, it is not available as a defense to parties claiming liens. Episcopo v. New York, 72 N. Y. Supp. 140. Fortunato v. Patten, 147 N. Y. 277, 41 N. E. 572.

When a contract to do work for a city is assigned as a whole after a part performance, the assignment includes all sums due for work previously done under the contract which have been retained by the city to ensure performance. Chapin v. Pike, 184 Mass. 184, 68 N. E. 42.

As a general rule, an assignment made in direct contravention of a statute would be void and unenforceable; but the statute may show that the legislature had in view only a limited purpose, as the following decisions indicate.

Chapter 444 of the New York Laws of 1897 provides, in substance, that if any contractor to whom a municipal contract is let shall, without the previous written consent of the department or official awarding the same, assign, transfer, convey, sublet or otherwise dispose of the contract; or his right, title, or interest therein, or his power to execute such contract, to any other person, the municipal corporation shall be relieved and discharged from any and all liability and obligation growing out of said contract to said contractor, and to the person, company, or corporation to whom he shall assign, transfer, convey, sublet or otherwise dispose of the same. It was held that the statute would not prevent a contractor from subletting a portion of the work envolved in the contract. Any other construction would require a contractor, in order to perform a contract entered into with a municipality envolving a variety of work, to do substantially all of it by day's labor. The prohibition is against assigning, subletting, etc., the whole or the substantial part of a contract entered into with a municipality, so as to put it out of the power of the original contractor to perform it. The New York Appellate Division said Ocorr v. Little Falls, supra, that it is evident that the act was passed for the purpose of preventing a sort of brokerage in city contracts,—to prevent a party from obtaining a contract from a municipality, and then assigning it and the whole of it to some one else, and thus relieve himself of all responsibility in respect thereto.

A contractor, by giving an order on a fund to accrue from the performance of a public contract, neither assigns, sublets, or disposes of the contract nor his power to execute it, and does not contravene thereby the provisions of chapter 444 of the New York Laws of 1897, referred to above. On the contrary, the negotiation of the order may secure to the contractor the very means to carry out his contract. Brace v. Gloversville, 167 N. Y. 452, 60 N. E. 779.

A entered into a contract with the city of St. Paul for the construction of certain public works. After a part of the work had been done he became bankrupt and abandoned it. He had assigned to B the money due from the city on the contract. In an action against the city it was held, Dickson v. St. Paul, 97 Minn. 258, 106 N. W. 1053, that the assignment was legal, and not in violation of section 12 of chapter 15 of the city charter which provides that no contract with the city for the doing of any public work shall be assigned or transferred in any manner. The court said that if the charter provision were construed so as to deprive the contractor of his right to assign his claims against the city, it would be a very serious question whether it would not be void as an attempt to improperly restrain the rights of individuals in respect to private contracts. On the contrary, the evident purpose of the provision is to prohibit an assignment or transfer of a contract which will work a novation of parties and thus substitute another party for the one with whom the city entered into contractual relations and in whose capacity and ability it has confidence.

It is no objection to the assignment of the contract, as between the parties to it, that the assignee is a trustee of the town; though he would not be permitted to make a profit out of it. Town of Tipton v. Jones, 77 Ind. 307.

An express provision in a contract with a municipality that it shall not be assigned is enforceable. A paving contract provided that the contractor should not "assign or transfer this contract or sublet any of the work embraced in it." The court said, holding that an assignee thereof could not recover the money due thereunder, or any part thereof: "But it is needless for us to speculate on the motives for the city's action. It is enough for us to know—whatever its reasons may have been—that it has, in plain language, stipulated against an assignment of the contract. That stipulation is valid and must be enforced." Murphy v. City of Plattsmouth, 78 Neb. 163, 110 N. W. 749.

In the absence of any law designating the officer to whom notice of the assignment should be given, notice of it should no doubt be given to the officials through whom the contract was made, though there is no decision expressly on the point, Philadelphia v. Lockhardt, 73 Pa. St. 211.

## STREET LIGHTING IN BALTIMORE

### Most Lamp Fixtures Are Owned and All Are Operated by Private Corporations—Prices Paid —Lighting Alleys—Street Signs.

The Department of Lamps and Lighting of Baltimore, Md., has under its supervision 20,419 lamps, maintained by contract, of which 567 were installed during 1918. It also has charge of street signs, and the inspection of gas and electric meters used by city departments and in public places. Also it tests coal oil sold by retail dealers in quantities of less than a barrel.

Its duties in connection with the street lamps include locating, supervising and erecting all new lamps; exacting the terms of the contracts with lighting contractors; planning the installation of additional lamps of all kinds in advance of new paving in both old and new streets; and transferring existing lamps from old to new locations for the purpose of improving the service. Street signs are erected and kept in repair by it.

Much of the extension work planned for 1918 was prevented by war conditions, but the superintendent of the department, William Mohr, hopes to make considerable progress this year toward catching up. Among other restrictions on service last year, about a thousand lamps were cut out of service under direction of the fuel administrator, the service being restored to normal conditions on November 23rd. This saved the city approximately $12,500.

All the ornamental luminous arc lamps and fixtures comprising the "White Way" districts, the ornamental lamps and fixtures in service on the several boulevards in North Baltimore, City Hall Plaza, Polytechnic Institute, Eastern and Western High Schools, sewage pumping station, and the various bridges, together with the gas lamp-posts and lanterns (except a number of boulevard lanterns and patent lamp burners), are the property of the city. All other lamp fixtures are the property of the several contractors.

#### OPERATION OF LAMPS.

All the street lamps are operated and maintained under contract with private corporations, with the exception of certain incandescent electric lamps which are owned by the city and are operated and maintained by the department direct, the current being supplied by the Consolidated Gas, Electric Light & Power Company, and paid for by meter measurement. Also the lamps around the sewage pumping station and those on the City Hall Plaza are operated and maintained by the department, the current being supplied from the high-pressure pumping station.

The prices paid are as follows: Incandescent mantle gas lamps, $17; incandescent naphtha, $29; incandescent electric, 200 c. p., overhead service, novalux fixtures, $41.30; 40 c. p., underground, $32.20; 40 c. p., overhead $20.70; "White Way" luminous arc, all-night underground, $87.60; the same, half-night, $84; 6.6 amp. arc, old type, all-night, underground, $78; same, half-night, $74; same, all-night, overhead, $66; 4 amp. arc lamps, all-night, overhead, $62; same, half-night, underground, $70; same, all-night, underground, $74. Incandescent electric, ornamental, 60 c. p. lamps, owned and maintained by the department, cost $15.22; and ornamental clusters of 60 and 80 c. p. incandescent electric, owned and maintained by the department, cost $8.74, not including the current. Current used in public buildings cost 5 cts. per kw. h. for the first 40,000 per month, and 3.66 cts, for all over this; and 3 cts, for a consumption of 15,000 kw. h. in any one month at one location.

During the year, 1,119 "White Way" ornamental posts, located in the business districts, were thoroughly overhauled, repaired and painted, thus adding to the attractiveness of the street lamp equipment.

#### COST OF GAS.

The gas and naphtha lamps are operated by the American Street Lighting Company, the gas being supplied by the Consolidated Gas, Electric Light and Power Company.

The city pays for all gas for street and outdoor lamps located along the company's mains, $6.50 per lamp per year, not exceeding two and one-quarter cubic feet of gas per hour, per lamp, payable at 54 1/6 cts. per month per lamp; and for all gas consumed in excess of an average of two and one-quarter cubic feet per hour, per lamp, 50 cts. per thousand cubic feet for such excess. Should the average consumption of gas exceed three cubic feet per hour, per lamp, such excess is charged to the American Street Lighting Company.

The cost for gas supplied to the city along the company's mains, for lighting the public buildings of the city, is a primary rate of 70 cts. per thousand cubic feet of gas, and a secondary rate of 50 cts. per thousand cubic feet of gas. The primary rating is set for a specified number of cubic feet of gas used monthly at each separate premise, excess of this to be charged for at the secondary rate.

The cost for service connections from main to outdoor lamp is $11 each for material and labor, the city also paying for replacing improved pavements. From main to curb only, the price is $8; and from curb to lamp only, $5.

#### LAMPS IN ALLEYS.

Where found necessary, the matter of lighting very dark alleys has been taken up by the department during the year and, upon urgent demands by the citizens, 59 lamps were installed in these alleys. Under an arrangement with the Electric Commission and the Consolidated Gas, Electric Light and Power Company, all the lamps installed in the several alleys in a block are fed overhead from a primary pole which has been connected up with the underground service from the main thoroughfare. This system has reduced the cost to the Electrical Commission for labor and material, as it has been the means of eliminating the necessity of laying conduits up these alleys, as well as effecting a saving in the expense to this department for the maintenance and operation of these lamps.

The several playgrounds and athletic fields have been lighted during the year for the convenience of those who use these grounds and fields for recreation.

#### STREET SIGNS.

Due to the opening of new streets, changing the street names in the old sections of the city, and the discarding of old and worn-out street signs, the department was required to furnish and erect 34 signs of blue enamel on iron with white letters; 682 ruby glass with white letters; and 868 "White Way" luminous lamp globes, lettered. The department painted and made a number of repairs to hospital zone signs.

# WATER RATES AND FIRE PROTECTION CHARGES

**Data from Several Hundred Cities of the United States—Maximum and Minimum Rates—Changes Since Before the War—Receipts for Public Hydrants and Private Fire Protection.**

### HYDRANT RENTAL (CONTINUED)

The other cities pay a fixed amount per hydrant per year. Of the 277 municipal plants, 146 receive nothing for hydrant rental or public fire protection, while only six of the private plants give this service free.

Of the 131 municipal plants which receive a stated sum per hydrant, fifteen receive $10 or less, sixteen receive more than $10 but not more than $20, thirty-six receive more than $20 but not more than $30, thirty-seven receive more than $30 but not more than $40, seventeen receive more than $40 but not more than $50, five receive more than $50 but not more than $60, and five receive more than $60.

Of the private plants, sixty-three receive stated sums per hydrant per year, of which five receive $10 or less, four receive more than $10 but not more than $20, fourteen receive more than $20 but not more than $30, nineteen receive more than $30 but not more than $40, thirteen receive more than $40 but not more than $50, four receive more than $50 but not more than $60, and four receive more than $60.

One municipal plant receives as little as $3.50 and one $4 per hydrant per year, and four receive $5. The highest rate reported by a municipal plant was $73.33. One private plant receives $3 and two receive $6, which are the only sums less than $10 reported. The highest rates reported by private plants were $100 and $95 respectively.

The average rate received by municipal plants, not including those which receive nothing at all, was $32.36; or, if we include, in averaging, those plants which receive nothing, the average becomes $15.54. The average for the private plants, omitting those which furnish

### METER RATES AND FIRE PROTECTION (Continued).

| City and State. | Municipal or Private. | Maximum Meter Rates. Rate. | For consumption less than | Minimum Meter Rates. |
|---|---|---|---|---|
| **Ohio:** | | | | |
| Akron | Municipal | ........ | ........ | ........ |
| Ashland | Municipal | ........ | ........ | ........ |
| Athens | Municipal | 20c. per M | 25,001 | 9c. per M |
| Barnesville | Municipal | $1.60 quarterly | ........ | ........ |
| Bellefontaine | Municipal | 15c. per M | 25,001 per month | 10c. per M |
| Bryan | Municipal | 30c. per M | 10,001 per quarter | 8c. per M per quarter |
| Chillicothe | Private | 20c. per M | 50,001 per quarter | 15c. per M |
| Cincinnati | Municipal | 10c. per 100 cu. ft. | Straight | ........ |
| Cleveland | Municipal | 4c. per 100 cu. ft. | ........ | ........ |
| Conneaut | Private | 25c. | 1,001 daily | ........ |
| Coshocton | Municipal | 25 per 100 cu. ft. | 1,001 cu. ft. | 6c. per 100 cu. ft. |
| Dayton | Municipal | 9c. per 100 cu. ft. | 10,001 cu. ft. per quarter | 4½c. per 100 cu. ft. |
| Delaware | Private | 20c. per 100 cu. ft. | 4,001 cu. ft. | 8c. per 100 cu ft. |
| Dover | Municipal | 20c. | 301 per day | 6c. |
| East Cleveland | Municipal | 8c. per 100 cu. ft. | Straight | ........ |
| East Liverpool | Municipal | 77c. per M | ........ | ........ |
| East Youngstown | Municipal | 30c. | 6,001 per quarter | 15c. |
| Eaton | Municipal | 23c. | 1,001 per day | 12½c. |
| Findlay | Municipal | 18c. per 100 cu. ft. | 201 cu. ft. | 6c. per 100 cu. ft. |
| Fostorio | Municipal | 15c. per 100 cu. ft. | 3,500 cu. ft. per month | 5.25c. per 100 cu. ft. |
| Girard | Private | 35c. | 15,001 | 10c. |
| Lakewood | Municipal | 9c. per 100 cu. ft. | Straight | 8.1c. |
| Marietta | Municipal | 30c. per M | ........ | 9c. per M |
| Martins Ferry | ........ | 4c. per M | 100,001 | 2½c. per M |
| Napoleon | Municipal | 24c. per 100 cu. ft. | ........ | Sliding scale. |
| Newark | Municipal | 18c. per 100 cu. ft. | 10,000 cu. ft. per quarter | 8c. per 100 cu. ft. |
| Piqua | Municipal | ........ | ........ | ........ |
| Ravenna | ........ | 18c. per 100 cu. ft. | 15,001 cu. ft. | 7c. per 100 cu. ft. |
| Sidney | Municipal | 22.2c. per 100 cu. ft. | 4,001 cu. ft. per quarter | 8c. per 100 cu. ft. |
| Steubenville | Municipal | 19c. | ........ | 10c. |
| Tiffin | Private | 21c. per 100 cu. ft. | 1,001 cu. ft. per quarter | 10½c. per 100 cu. ft. |
| Troy | Municipal | 20c. per M | 10,001 | 12c. per M |
| Urbana | Municipal | 25c. per M | 45,001 | 10c. per M |
| Van Wert | Municipal | 35c. per M | 45,001 | 30c. per M |
| Wadsworth | ........ | 25c. per M | Straight | ........ |
| Wilmington | Private | 25c. per M | ........ | ........ |
| Xenia | Private | 32.4c. per M | 8,501 per day | 15.9c. per M |
| **Oklahoma:** | | | | |
| Durant | Municipal | 50c. per M | 2,001 | ........ |
| Oklahoma City | Municipal | 25c. | 10,001 | 10c. |
| **Oregon:** | | | | |
| Baker City | Municipal | 10c. per M per month | ........ | ........ |
| Corvallis | Municipal | 15c. per M | 50,001 | 8c. per M |
| Hood River | Municipal | 33c. per M | 5,001 | 11c. per M |
| Klamath Falls | Private | ........ | 2,250 | 7c. per 100 cu. ft. |
| Mansfield & North Bend | Private | ........ | ........ | ........ |
| Portland | Municipal | 8c. per 100 cu. ft. | 20,001 cu. ft. | 6c. per 100 cu. ft. |
| **Pennsylvania:** | | | | |
| Barnesboro | Municipal | 30c. per M | 100,000 per month | ........ |
| Beaver Falls | Private | 66.3c. per M | 4,001 per quarter | 6c. per M |
| Bellefonte | ........ | 5c. per M (in boro limits) | 1,000,001 | 3c. per M |
| Bradford | Municipal | ........ | ........ | ........ |
| Carbondale | Private | 30c. per M | Domestic | 8c. per M |
| Catasauqua | Municipal | 25c. per 100 cu. ft. | 2,101 | 4c. per 100 cu. ft. |
| Chambersburg | Municipal | 10c. per 100 cu. ft. | ........ | 3c. per 100 cu. ft. |
| Chester | Private | 34½c. per M | 15,001 | 11½c. per M |
| Clearfield | Private | 20c. per M | 25,001 per quarter | 4c. per M |
| Coraopolis | Municipal | 30c. per M | 25,001 | 7c. per M |
| East Stroudsburg | Municipal | 9c. per 100 cu. ft. | 500,001 cu. ft. | 3c. per 100 cu. ft. |
| Freeland | Private | ........ | ........ | ........ |
| Harrisburg | Municipal | 4.3c. per 100 cu. ft. | Straight | ........ |
| Indiana | Private | $1 per M | 3,001 | 15c. |
| Jersey Shore | Private | 25c. per M | 100,000 per quarter | 5c. per M |
| Johnstown | Private | ........ | ........ | ........ |
| Juniata | Municipal | 6c. per M | Straight | ........ |
| Lancaster | Municipal | 5c. per M | 50,000 | ........ |
| Lewistown, 4 other municipalities & adjacent territory | Private | 33⅓c. per 100 cu. ft. | 301 cu. ft. | ........ |

## METER RATES AND FIRE PROTECTION (Continued)

| City and State. | Minimum Meter Rates For consumption more than | Increase since before the war. | City pays for fire hydrants. | Charge for private hydrants or sprinklers. |
|---|---|---|---|---|
| **Ohio:** | | | | |
| Akron | ........ | From 10c to 12c per 100 cu. ft. | Nothing | 2-in., $8; 3-in., $12; 4-in., $16; 6-in., $24 |
| Ashland | ........ | Will raise rates first of next year $2 per 2,000 cu. ft. | Nothing | None |
| Athens | 1,000,000 | None | Nothing | Have none |
| Barnesville | ........ | About 10%; will raise again about 1920 | Nothing | None |
| Bellefontaine | 250,000 per month | 10c to 15c per M. gal. | Nothing | Charge for sprinklers, but not hydrants |
| Bryan | 50,001 per quarter | Maximum from 25c to 30c; minimum from 6c to 8c | Nothing | None |
| Chillicothe | 100,000 per quarter | None | $50 each per year | 7½c per sprinkler head |
| Cincinnati | ........ | 25% increase, Jan. 1, 1918 | Nothing | None |
| Cleveland | ........ | None | Nothing | 1½-in., $8; 2-in., $10; 3-in., $15; 4-in., $18; 6-in., $50 |
| Conneaut | ........ | Proposed | $35 per year | According to size of plant |
| Coshocton | 1,000 cu. ft. | None | Nothing | None |
| Dayton | 500,000 cu. ft. per quar. | Slight increase to some and decrease to others | All credit | $5 for fire hydrants. Fire line service, 2-in., $5, to 8-in., $37.50 |
| Delaware | 4,000 cu. ft. | None | $40 each | None |
| Dover | 10,000 | None | Nothing | None |
| East Cleveland | ........ | 1c per 100 cu. ft. | ........ | ........ |
| East Liverpool | ........ | About 75% | Nothing | ........ |
| East Youngstown | 300,000 | None | Nothing | $20 per year for each opening |
| Eaton | 3,000 per day | $1 per year | Nothing | Have none |
| Findlay | 3,200 cu. ft. | None | $40 each credit | None |
| Fostorio | 67,000 cu. ft. per month | ........ | Nothing | Sprinklers metered |
| Girard | 2,000,000 | None | $45 for first 50, $40 for next and $35 for | By meter |
| Lakewood | If paid within 30 days | None | Nothing | 6-in., $50 per year, to 3-in., $15 |
| Marietta | 20,000 per day | 10% | Nothing | None |
| Martins Ferry | 100,000 | None | ........ | ........ |
| Napoleon | ........ | 10% | Nothing | None |
| Newark | 100,000 cu. ft. per quar. | Maximum, 15c to 18, and so on | $20 each cerdit | None |
| Piqua | ........ | None | Credit valuation | None |
| Ravenna | 300,00 cu. ft. | 33⅓%, May 1 | None | None |
| Sidney | 70,000 cu. ft. | None | None | None |
| Steubenville | 100,000 | 20% | Bought by dept. public safety | According to size of building |
| Tiffin | 22,000 cu. ft. per quar. | 20% | $40 each | Sprinklers, $10 per 1,000 sq. ft. to 10,000 sq. ft. floor space; $5 per 1,000 over that |
| Troy | 10,000 | None | Nothing | None |
| Urbana | 45,000 | None | Nothing | None |
| Van Wert | 45,000 | None | .......... | None |
| Wadsworth | ........ | 50%; decrease proposed | Village retires bonds for street lighting bonds and rental | Have none |
| Wilmington | 98,000 | None | $3.75 each per month | $15 per year |
| Xenia | ........ | First fixture increased from $5.75 to $10.20; not much change in others | $68 per plug; old rate, $32 | 3-In., $44; 4-in., $56; 6-in., $140; and 8-in., $2.80 |
| **Oklahoma:** | | | | |
| Durant | ........ | 20% | None | None |
| Oklahoma City | 1,000,000 | 5c per M. | None | None |
| **Oregon:** | | | | |
| Baker City | ........ | None | 185 hydrants; $2 each per month | Have none |
| Corvallis | 2,000,000 | None | Nothing | Meters required |
| Hood River | 20,000 | None | Nothing | None |
| Klamath Falls | 5,000 cu. ft. | None | $22 each per year | ¾-in. hydrant, 50c, to 2-in., $2 per month |
| Portland | 20,000 | None | General fund pays interest on bonds amounting to $50,000 | Metered |
| **Pennsylvania:** | | | | |
| Barnesboro | ........ | From 24c to 30c per mo. | Nothing | None |
| Beaver Falls | 2,250,000 per quar. | None | $400 per mile and $7 each per year | 2-in. tap, $75 per year, to 8-in., $300 |
| Bellefonte | 1,000,000 | None | Nothing | None |
| Bradford | ........ | None | Nothing | None |
| Carbondale | 1,000,000 | Minimum rate from 6c to 8c | ........ | 1-in., $10, to 10-in., $300, and meter rates |
| Catasauqua | 140,000 | Slight increase proposed | $600 per year for 70 hydrants | $15 and flat rate for sprinklers |
| Chambersburg | 600,000 cu. ft. | 25c in minimum charge; no discount | $15 each | None |
| Chester | 750,000 | 15% | $40 each per 1,000 ft. of pipe; all others free | 4-in., $5.75, to 10-in., $13.80 |
| Clearfield | 600,000 per quar. | Reduced | $10 each per year | 6-In., $150; 4-in., $75 per year for automatic sprinklers |
| Coraopolis | 2,000,000 | None | $35 each per year | None |
| East Stroudsburg | 4,000,000 cu. ft. | None | ........ | $5 per year |
| Freeland | ........ | ........ | ........ | $20 per year |
| Harrisburg | ........ | ........ | No charge, but allow $50 worth of water each year | None |
| Indiana | ........ | None | $25 per hydrant | $25 per year |
| Jersey Shore | 5,000,000 per quar. | None | $20 each for 85 hydrants per year; each additional, $9 | ........ |
| Juniata | ........ | None | Nothing | ........ |
| Lancaster | ........ | Proposed | $35 each | $10 per year |
| Lewistown, 4 other municipalities & adjacent territory | ........ | None | $6 to $15 each per year | $15 each per year |

hydrant service free, was $36.56; or, including the free hydrants, the average was $33.78. It appears, therefore, basing the calculation only upon the payments made and omitting those cases in which hydrants were furnished free, that the average rate received by private companies is about $4 greater than that received by municipal departments.

## HORSES VS. MOTOR TRUCKS IN REFUSE COLLECTION.

### Comparison of Cost of Maintaining and Operating Each, from Experiences of Various Cities in Their Use for This Service.

In the study of the problem of refuse collection in Rochester, made by the Bureau of Municipal Research, the investigators obtained data concerning the cost of maintaining and operating both horses and motor trucks in such service in other cities, although they found comparatively few definite and reliable figures available. They reported the following:

### COST OF MAINTAINING HORSES.

According to the report of superintendent E. W. Stribbling, of the Division of Garbage and Refuse Collection, the cost of maintaining 142 horses by the city of Columbus, Ohio, in 1916 was 83.7 cents per horse per day. This included a cost of 41.63 cents for feed; 13.53 cents for veterinary services, shoeing and supplies; and 28.54 cents for stable labor. In 1915 the unit cost was 83 cents per horse per day, including 45.77 cents for feed, 11.98 cents for veterinary services, shoeing, supplies and 25.15 cents for stable labor. The labor force consisted of 16 men and a night watchman. The cost of feed was about $14 per ton for hay, 75 cents per bushel for corn and 50 cents per bushel for oats. Straw cost about $7 per ton. In 1916 each horse consumed daily 30 pounds of hay, and 13 pounds of grain; 5.3 pounds of straw were used in bedding each horse. In 1915 these quantities were 31 pounds, 12.75 pounds and 6.3 pounds respectively.

Similar costs for 1916 in the city of Cincinnati, given in the report of Fred Maag, superintendent of the Department of Street Cleaning, Sewer and Catch Basin Cleaning, indicate that 34.9 cents per horse per day was the cost of feeding and 39.4 cents was the cost of "other stable expenses," the total cost being 74.3 cents per horse per day. Approximately 190 horses and 80 mules were maintained in 17 stables, practically one-half of this number being boarded in one stable. Each horse consumed 14.7 pounds of hay, 11.5 pounds of oats and 2.8 pounds of nutritia daily. Hay cost about $18 per ton, oats 45 cents per bushel and nutritia, $1.50 per hundredweight. (No allowance apparently was made for bedding straw.)

In Washington, D. C., according to the report of the Engineering Department for the fiscal year, 1915-16, the cost of feed amounted to 40.2 cents per horse per day. The daily allowance per horse was 3.3 pounds of dry straw, 7 pounds of long timothy, 7 pounds of mixed clover hay, 12.8 pounds of oats and 1.7 pounds of bran. Straw cost at the rate of $16.00, long timothy at $20.80 and mixed clover hay at $20 per ton, oats at 54 cents per bushel and bran at $1.27 per hundredweight. The cost of shoeing was stated to be 2.6 cents per horse per day.

In the annual report of the Department of Street Cleaning of New York, in 1916, Commissioner J. T. Fetherston states that the cost of "labor, materials, supplies and consumable equipment used directly in the care of horses" amounted to $1.087 per horse per day and that this cost represents prices of forage and supplies considerably above normal. About 64 per cent of the total cost represents the cost of forage, 30 per cent the direct labor cost and 6 per cent the cost of maintaining stable equipment. In the 26 stables maintained by the department 2,400 horses were cared for. One hostler and one stableman were employed for each 13 horses. In 1917, the daily allotment for each horse was 23 pounds of oats, 18 pounds of hay, 3 1-7 pounds of bran and 3 pounds of straw. In addition to this each horse was given 1 1-2 pounds of coarse salt and 2 1-2 pounds of rock salt per month. When idle the horses were given half ration of oats. In 1916, the daily ration was 21 pounds of oats, 15 pounds of hay and 1 1-7 pounds of bran. The other items were practically the same as for 1917. This appears to be an unusually heavy ration and the cost of feed alone was practically 70 cents per horse per day.

The foregoing figures are about the only ones available for stable costs outside of Rochester. For Rochester it was possible to obtain from James M. Harrison, formerly superintendent for the Genesee Reduction Company, data of the cost of maintaining horses employed in garbage collection from 1908 to 1916. On January 1, 1917, the Department of Public Works took over the operation of the garbage plant stables and the 1917 costs, therefore, are available also.

In 1917 the 68 horses quartered at the garbage plant stables cost about 68 cents per horse per day to maintain. The approximate cost of feed amounted to 50.7 cents; the direct labor cost of stable operation, 9.4 cents; and the estimated cost of barn supplies, shoeing and harness repair, 7.9 cents per horse per day. No exact ration allotment was made, but according to the total quantities purchased during the year each horse consumed about 11 pounds of oats and 22 pounds of hay per day. The approximate average cost of oats was 80 cents per bushel and the cost of hay was about $18 per ton. The stable force consisted of one barnman and three helpers, the barnman and one helper working seven days and the other two helpers six days per week. The drivers cleaned and harnessed the horses and gave them their noon feeding.

The foregoing data and certain additional data as to the cost of maintaining horses by the Genesee Reduction

COMPARISON OF RATIONS AND COST OF FEEDING HORSES IN FIVE CITIES.

| Location. | Year. | Number of Horses. | Daily Ration per Horse. Grain lbs. | Hay lbs. | Straw lbs. | Feed | Stable Labor | Miscellaneous | Total | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|
| Columbus, Ohio | 1915 | 142 | 12.75 | 31.0 | 6.3 | $0.4577 | $02.525 | $0.1198(a) | $0.830 | Hay at $14 ton; corn at 75c. bu.; oats at 50c. bu.; straw at $7 ton. |
| | 1916 | 142 | 13.00 | 30.0 | 5.3 | 0.4163 | 0.2854 | 0.1353(a) | 0.837 | |
| Cincinnati | 1916 | 270(b) | 11.5<br>2.8(c) | 14.7 | ... | 0.3490 | ...... | 0.3940(d) | 0.743 | Hay at $18 ton; oats at 45c. bu.; nutritia at $1.50 cwt. |
| New York | 1916 | 2400 | 21.0(e)<br>1 1/7(f) | 15.0 | 3.0 | 0.696(g) | 0.326(g) | 0.065(g) | 1.087 | One hostled and one stableman for every 13 horses. No data as to purchase prices of food. |
| | 1917 | 2400 | 23.0(e)<br>3 1/7(f) | 18.0 | 3.0 | (h) | (h) | (h) | (h) | |
| Washington | 1915 | (h) | 12.8<br>1.7(i) | 14.0 | 3.3 | 4.402 | (h) | 0.026(j) | (h) | Hay at $20 80 and $20 ton; straw at $16 ton; oats at 54 c. bu.; bran at $1.27 cwt. |
| Rochester | 1917 | 68 | 11.0 | 22.0 | ... | 0.507 | 0.094 | 0.079(k) | 0.680 | Oats at 80c. bu.; hay at $18 ton. |

(a) Includes shoeing, supplies and veterinary services; (b) 190 horses and 80 mules; (c) nutritia; (d) includes stable labor and "other stable expenses"; (e) idle horses given half rations of oats; (f) bran, also each horse given 1½ lbs. coarse salt and 2½ lbs. rock salt per month; (g) approximate; (h) data incomplete or not available; (i) bran; (j) shoeing only; (k) includes supplies, shoeing, harness repairs.

Company before 1917, are shown in the accompanying tables:

**Cost of Feeding Horses Employed in the Collection of Garbage in Rochester, N. Y., 1908 to 1916.**

(By Courtesy of James M. Harrison, Formerly Superintendent for Genesee Reduction Company.)

| Year | Total Cost of Feed (Grain, Hay, Straw) | Approximate No. Horses Fed | Average Cost per Horse per Day |
|---|---|---|---|
| 1908.......... | $7364.08 | 40 | $0.505 |
| 1909.......... | 6964.89 | 40 | .477 |
| 1910.......... | 6912.67 | 40 | .474 |
| 1911.......... | 6827.04 | 40 | .467 |
| 1912.......... | 7816.29 | 65 | .330 |
| 1913.......... | 9269.83 | 65 | .395 |
| 1914.......... | 8771.77 | 65 | .370 |
| 1915.......... | 10666.02 | 66 | .443 |
| 1916.......... | 9570.47 | 66 | .397 |

**Cost of Renewals of Horses Employed in the Collection of Garbage in Rochester, N. Y., 1912 to 1917.**

| Year | Total expenditures for horses | Approximate No. of horses | Average cost per horse per year |
|---|---|---|---|
| 1912............. | $2219 | 65 | $34 |
| 1913............. | 1885 | 65 | 29 |
| 1914............. | 4205 | 65 | 65 |
| 1915............. | 1020 | 66 | 15 |
| 1916............. | 1575 | 66 | 24 |
| 1917............. | 1125 | 68 | 17 |

Estimates as to the economic life of a horse used in collection work vary from 4½ to 8 years. It is believed, however, that a horse should give at least six years of useful service in this kind of work. Assuming a first cost of $275 and a salable value of $75 at the end of six years, the annual depreciation would be $33.33 per year per horse.

From the foregoing and other data it appears that a horse used in collection work should be fed on the average about 20 pounds of hay and 14 pounds of oats per day, in addition to possibly 2 pounds of other feed consisting principally of bran, salt, etc. Also each horse should be bedded with approximately 5 pounds of dry straw daily. On this basis and with hay costing $18 per ton, oats 80 cents per bushel, other feed $1.50 per hundredweight and straw $12 per ton, the total daily cost per horse of feed and bedding would amount to the following:

| | |
|---|---|
| 20 lbs. of hay at $18.00 per ton................ | $0.18 |
| 14 lbs of oats at $.80 per bu.................... | .35 |
| 2 lbs. of other feed at $1.50 per cwt.......... | .03 |
| 5 lbs. of straw at $12.00 per ton.......... | .03 |
| Total estimated cost of feed and bedding per horse per day............................ | $0.59 |

In addition to this, the cost of veterinary services, maintenance of stable equipment and supplies, shoeing, and harness repairs should not exceed 12 cents per horse per day. If one hostler at $800 per year and one stableman at $750 per year were provided for every 20 horses, the direct labor cost of stable operation would amount to about 21 cents per horse per day. This would include the cost of all work involved in feeding, bedding, cleaning and otherwise caring for horses, and all labor about the stables such as cleaning stables, handling feed and supplies, handling and moving equipment, cleaning equipment, etc.

The total cost per horse per day, therefore, might be estimated at 92 cents, distributed as follows:

| | |
|---|---|
| Feed and bedding............................ | $0.59 |
| Veterinarian, shoeing, harness repairs, etc.... | .12 |
| Direct labor cost of stable operation........ | .21 |
| Total maintenance cost per horse per day.... | $0.92 |

The annual cost of maintaining horses at this figure would be $336.65 per horse, exclusive of the cost of overhead supervision; fixed charges on first cost of horses, stable sites and stable buildings, depreciation of horses, and depreciation and maintenance of stable buildings.

The annual (purchase) cost of the horses used in garbage collection in Rochester since 1912 has been about $31 per horse, which includes replacements as well as the purchase of three horses during the six years in addition to the number owned at the beginning of the period.

### COSTS OF MOTOR TRUCK OPERATION.

In 1914 a 5-ton truck equipped with a specially designed 10-yard collection body was given a trial in house-to-house collection of garbage and ashes on a three-mile haul in the borough of the Bronx, New York City. It was given a further trial in hauling garbage from relay stations in the outlying sections of the borough. On the three-mile haul in making house-to-house collections the truck did not prove as economical as the one-horse carts generally used. But in hauling from relay stations on the longer haul the truck showed a considerable saving over horse-drawn carts. The haul for this work was approximately seven miles. The truck made four round trips for a total of 54.2 miles and hauled 27.6 tons of garbage as against about one and one-half trips made in the same length of time by a one-horse cart hauling approximately 1 1-2 tons (0.9 ton per load). On the shorter haul the cart made three round trips per day for a total distance of 18 miles including house-to-house collections and hauled 5.4 tons; the truck made five round trips for a total distance of 32.7 miles and hauled 23.85 tons.

The poorer showing of the truck on house-to-house collections was attributed to the time spent in loading. Although four helpers were provided, the time so spent represented more than one-half the total time. The time spent in traveling to and from the dump was only one-fifth the total time. On relay work, however, the loading time was only 35 per cent of the total time.

The one-horse cart outfit cost $4.32 per day. The total daily cost of operating the truck was $13.70, distributed as follows:

| Item | Total cost | Per cent of total |
|---|---|---|
| Gasoline ....................... | $2.41 | 17.6 |
| Oil ............................. | .75 | 5.4 |
| Truck Depreciation (Cost $5,000, life 5 years).................. | 2.78 | 20.3 |
| Interest on investment at 6%... | .83 | 6.1 |
| Repairs, labor, materials, tires, grease and miscellaneous..... | 4.07 | 29.7 |
| Garaging ......................... | .30 | 2.2 |
| Driver's pay .................... | 2.56 | 18.7 |
| Total ......................... | $13.70 | 100.0 |

The New York Department of Street Cleaning has used large tractor-trailer motor propelled collection units to some entent. These are giant outfits hauling 25 cubic yards of refuse per load. Collections of ashes, rubbish and garbage are made simultaneously, but in separate compartments. The average haul is about 1½ miles. Special equipment is provided for unloading the refuse onto scows. The principal factor tending to produce economy from the collection standpoint is the fact that all refuse is dumped at a common point of disposal. For this reason all refuse may be collected at one time by providing separate refuse compartments on the collection vehicles.

In Philadelphia a part of the collection equipment has been motorized. Five-ton trucks equipped with 12-yard bodies have proven economical in the collection of ashes and rubbish from sections where the haul to the dump averages six miles.

*(To be concluded)*

# NEWS OF THE SOCIETIES

**Aug. 26-28.—LEAGUE OF CITIES OF THE THIRD CLASS IN PENNSYLVANIA. Twentieth annual convention, Allentown, Pa. Secretary, Fred H. Gates, city clerk, Wilkes-Barre, Pa.**

**Aug. 27-29.—VIRGINIA STATE FIREMEN'S ASSOCIATION. Thirty-third annual meeting, Charlottesville, Va. Secretary, E. K. Landis.**

**Sept. 30-Oct. 1-3.—NEW ENGLAND WATERWORKS ASSOCIATION. Annual meeting, Albany, N. Y. Secretary, Tremont Temple, Boston, Mass.**

**Oct. 27-30.—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, New Orleans, La. Secretary, A. W. Hedrich, 169 Massachusetts ave., Boston, Mass.**

**Nov. 12-14.—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Springfield, Ill.**

### American Association of Engineers.

That the American Association of Engineers is making progress in establishing more favorable schedules of salaries for engineers in municipal work is indicated by the success of the St. Louis Chapter of the association in obtaining the support of the Board of Aldermen of St. Louis to that chapter's campaign for higher compensation for engineers employed by the city. A bill introduced before the Board of Aldermen on May 16, 1919, had been approved by the Efficiency Board and indorsed by the Associated Engineering Societies of St. Louis, but had been held in the hands of the Board of Estimate and Apportionment without further action. In order to have the bill called for action the St. Louis Chapter drafted and had introduced a resolution before the Board of Aldermen requesting the Board of Estimate and Apportionment to call up the bill for consideration. As this resolution was adopted unanimously by the Board of Aldermen, and as mayor H. W. Kiel has announced himself as favoring the bill, it is expected that it will be passed very soon. The bill provides for an increase of about 15 per cent in the salaries of engineers, draftsmen and related technical men.

The organization committee appointed by the Executive Board of the American Association of Engineers to study the pay of engineers in public service and to recommend schedules of salaries held a meeting in Chicago on August 2. The committee recommended to the National Executive Committee that a sub-committee be appointed to study and report at once on salaries for highway engineers, and that other sub-committees be appointed from time to time to take up similar studies in other branches of public service, and that the second sub-committee to be appointed be instructed to study and report a schedule of salaries for municipal and county engineers. The report of the Organization Committee was approved by the Executive Committee and the sub-committee will be appointed and the names of its members announced soon. The Organization Committee consists of A. N. Johnson, chairman; S. C. Hadden, A. R. Hirst and F. H. Newell.

Dr. F. H. Newell, president of the American Association of Engineers, left on August 10 for an extended trip through the western part of the United States. Dr. Newell spoke at Kansas City on the 11th before the Engineers' Club of that city; at Denver on the 12th; and at Salt Lake City, where he installed a chapter of A. A. E., on the 15th.

Dr. Newell will speak at Boise on the 18th; at Spokane on the following day, and at Tacoma and Seattle on the 21st. He will install the Portland Chapter, with which the Oregon Society of Engineers has voted unanimously to affiliate, on the 22d, and will then proceed to San Francisco, Sacramento and Los Angeles. Chapters will be installed in these three cities, and it is expected that at Los Angeles the installation will include as part of the chapter the Engineers' and Architects' Association of Southern California, a society of about 350 members. On his return journey Dr. Newell will address various groups of engineers, including the Southwestern Society of Engineers at El Paso, the Oklahoma Chapter of A. A. E., and the St. Louis Chapter, where preliminary arrangements are being made for the 1920 convention of the association, which will be held in that city.

### National Free Zone Association.

Delegations representing leading commercial organizations and official bodies from all parts of the country met recently at the headquarters of the Merchants' Association in New York City and organized the National Free Zone Association.

The purpose of the new organization is to work for federal legislation which will permit the establishment of "free zones" and to conduct a campaign of education in order to create sentiment in favor of free zones as aids to foreign trade.

Among the cities represented in the conference were Boston, Chicago, Cincinnati, Detroit, Los Angeles, New York, Baltimore, Newport News, New Orleans, Oakland, Philadelphia, San Francisco, Savannah, Seattle and Tacoma.

J. J. Dwyer, former president of the San Francisco Harbor Commission and now port development commissioner of the San Francisco Chamber of Commerce, explained the idea of the meeting, which originated with him. Arthur McGuirk, special council of the Board of Commissioners of the Port of New Orleans, spoke for the Association of Commerce. All present agreed on the importance of the free

*(Continued on page 114.)*

# PROBLEMS CITIES ARE STUDYING
## WITH EXPERTS

The village of Frazee, Minn. has advertised for bids for a complete WATER WORKS SYSTEM, plans for which have been prepared by the consulting engineer, W. C. Buck.

Paulsboro, N. J., is soon to receive bids for constructing eleven miles of SEWER, to cost $150,000. The consulting engineers are Remington & Vosbury.

Dayton, O., is to build SANITARY SEWERS in Mt. Auburn district to cost $100,000. Plans were prepared by the consulting engineers, Cellarius & Dressler.

PAVING IMPROVEMENTS are to be made by the city of Eufaula, Okla., involving 35 blocks of concrete in the principal street. The plans were prepared by the consulting engineering firm, The Hughes Engineering Co.

Ashland, Ky., has advertised for bids for WATER WORKS IMPROVEMENTS, including basins and a station building, 2,000,000 gallon daily capacity filtration equipment and centrifugal pumping equipment. The consulting engineers are Alvord & Burdick.

Cumberland, R. I., is to build a new SEWERAGE SYSTEM to cost $150,000, according to plans prepared by the consulting engineer, O. P. Sarle.

A reinforced concrete BRIDGE is to be built by Conshohocken, Pa., over the Schuylkill river, to cost $600,000, according to plans prepared by the consulting engineer, S. P. Mitchell.

Lake City, S. C., will receive bids shortly for a WATER WORKS and SEWERAGE SYSTEM to cost $90,000 and $60,000 respectively. The consulting engineers are The Tomlinson Engineering Co.

A CONCRETE STEEL BRIDGE is to be built by Watertown, N. Y., according to plans prepared by the Concrete-Steel Engineering Co., consulting engineers.

A WATER WORKS SYSTEM and SEWERAGE IMPROVEMENTS are to be built by the village of Hinckley, Minn. The work includes a distribution pipe system, steel tower and tank with 100,000 gallons capacity, the construction of a general sewer, including outlet, and district sewers for seven sewer districts. The consulting engineer is L. P. Wolff.

# NEW APPLIANCES

**Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.**

## AUSTIN MOTOR SWEEPER.

### Sprinkles, Sweeps, Collects and Transports.

The Austin motor sweeper has been developed to fill the urgent need for a sanitary street cleaning machine which will sprinkle, sweep and collect all kinds of street dirt in one operation and will transport it quickly, noiselessly and economically. The dust is eliminated by the spraying equipment, which is located far enough in front of the broom to give the water sufficient time to penetrate the dirt before sweeping. Since the whole cleaning process is complete there is no expense of providing collectors to follow the machine and no annoyance of dirt piles scattered by the wind. The sweeper moistens the dirt, but leaves no slimy deposits in the street or gutter. The pavement surface is not damaged. The dirt is swept on a carrier and is conveyed to an ample receptacle.

As the sweeper raises no dust it can be used in the business streets in the day time and it does not interfere with the traffic because its broom length is 7 feet. This length is also advantageous because a larger broom is ineffective on rough and uneven streets. As the machine operates noiselessly it may be used at night in residential districts, thus permitting 24-hour service if desired.

Economy is claimed for the motor sweeper in a number of ways. All the work is done by one man, who needs no preliminary training other than motor truck driving, as the Austin motor sweeper is handled just like any standard truck. The sweeper need not be laid off on account of bad weather as in the case of horse-drawn sweepers. It is claimed that the motor sweeper can clean four times the area in a given time, moving at a normal speed of eight miles an hour. There is no upkeep cost when the sweeper is not in actual use.

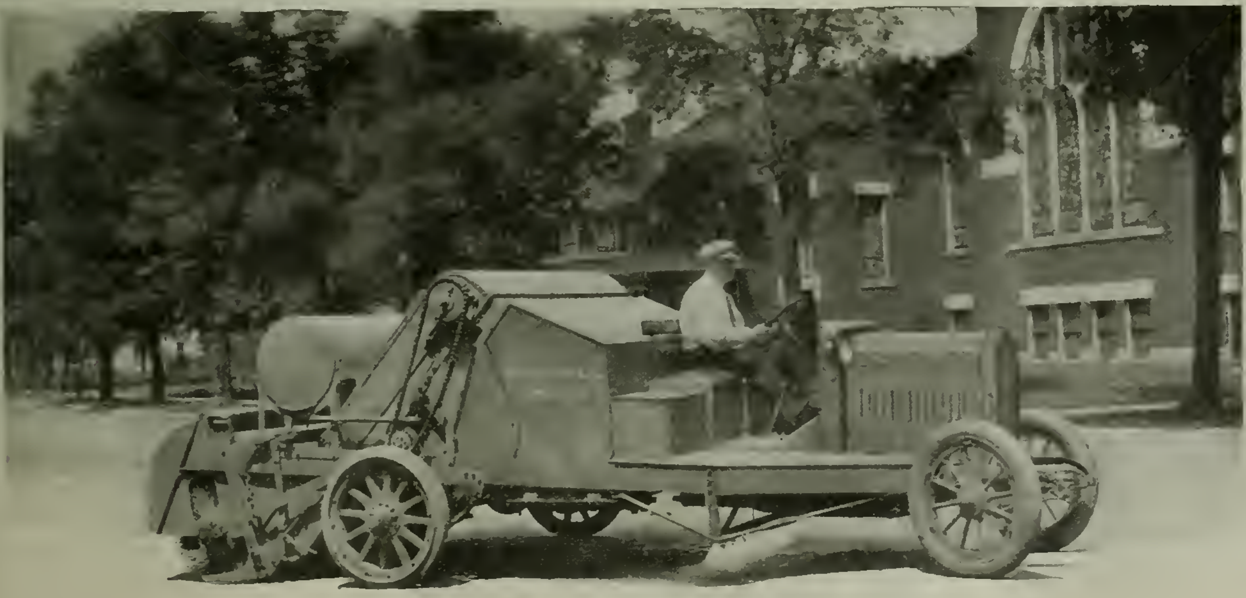
The machine is simple in design and sturdy in construction. It is economical and easy in operation. All parts are accessible without the necessity of crawling under the machine. The whole machine is based on a long study and practice of actual street cleaning so that all conditions are met.

The chassis is of exclusive design and is assembled by the manufacturers. Although specially shaped to distribute the weight of equipment mounted on it, it is designed on lines approved in recent motor truck practice. The truck is balanced on regulation motor springs and is carried on four wheels, assuring steady running and even sweeping. The motor is 4-cylinder, 4-cycle, with geared pump and force-feed lubrication. It develops 49 h. p. The radiator, steering gear, transmission, carburetor, magneto, etc., are all standard and particularly adapted to the service.

The sprinkling equipment consists of a supply tank of 150 gallons' capacity. Between the pump and the spray nozzles is an overflow valve, by means of which the driver controls the volume of water used. The spray nozzles are of solid brass and are placed behind the front wheels and about 14 inches above the pavement. The spray can be regulated to a sufficient force to penetrate the dirt and make it mealy.

The broom is 36 inches in diameter and 7 feet long. The standard and most satisfactory filler is split bamboo, of which about 175 pounds is used, filler extending 12 inches from the core. The average life of the broom is 150 hours of actual service. The broom spindles rotate in oil-tight boxes, equipped with self-aligning S K F bearings, which automatically adjust themselves to any pavement irregularities, driving the broom into depressions without binding. The broom is suspended on two coil springs and its pressure can easily be regulated by the driver. Two speeds are provided for driving the broom—high for unusually dirty streets or a worn broom, and regular speed for normal use. Throwing the broom into high speed automatically speeds up the conveyor and the water spray pump, the three members being driven from the same shaft. The broom is protected by a sheet steel housing, hinged at the top, allowing of quick and easy replacement of a worn broom.

The conveyor mechanism is of exclusive design. It consists of a sheet steel inclined plane on which the dirt, when thrown by the broom, is picked up by a series of rubber squeegees mounted at frequent intervals over the entire length of the conveyor. These squeegees are carried on high carbon steel chains, and on reaching the apex of the plane the dirt drops into the hopper. The squeegees being released from the pressure of the plant, snap themselves free from the dirt, pass over the upper sprockets and return for an-



AUSTIN MOTOR SWEEPER (Right-hand view)

other circuit. Being self-cleaning, they can collect even mud. Once the dirt or mud is on the conveyor it cannot be forced off or cause trouble by falling on the chain, the sprockets being above the plane. The upper driving spockets for carrying the chains are fitted with easily replaced wooden pins which break before clogging can cause any damage. Bearings and oil pockets assure easy operation.

There is ample clearance between the lower end of the conveyor and the pavement, so that the conveyor does not come underneath the broom or touch it. The broom revolves at a speed which throws the dirt on the conveyor, not merely pushes it. The conveyor does not gather the dirt, but allows it to remain undisturbed until engaged by the broom. The broom cannot be caught in or torn by the conveyor.

The hopper or dirt container is of all-steel construction, provided with heavy steel bottom doors, opening and closing of which are controlled by lever at driver's seat. The capacity of the hopper and of the water tank are so proportioned that as the tank becomes empty the hopper is about full and one stop of the motor sweeper can be used to fill the tank and dump the load.

The accompanying illustrations show a view of the sweeper and a detailed view of the rear end, bringing out sweeper and conveyor details. The sweeper is made by the Austin Manufacturing Co., Chicago, Ill., and sold by the Austin-Western Road Machinery Co., Chicago.

## INDUSTRIAL NEWS

**The Barber Asphalt Paving Company,** Land Title Building, Philadelphia, Pa., has issued a new Iroquois tool catalogue describing the complete line of asphalt tools. These include asphalt tampers and smoothers, concrete tampers, asphalt sandals, asphalt rakes, patching hoes, cutters, shovels and street scrapers, wire and rattan push brooms, stirring rods, asphalt and tar dippers, asphalt melting pots and pouring pots, brick filling pots, stone and binder forks, two-man stone rakes, old material pans, patrol kettles, fire wagons, asphalt hand rollers, surface heaters, etc. The tools are fully described and illustrated. The catalogue is for general distribution to contractors, engineers, purchasing agents, superintendents, dealers and all others interested.

**The Clinton-Wright Wire Company,** Worcester, Mass., has been organized by the combination of the **Clinton Wire Cloth Company, Wright Wire Company, Morgan Spring Company and National Manufacturing Company.** The companies have joined forces and co-ordinated manufacturing plants and facilities for greater service in supplying the large variety of wire and wire products manufactured by them and known to the trade for sixty years. The products of the new company include wire, wire cloth, wire screen cloth, wire netting, wire rope, wire lath, wire springs, wire forms, special manufacturers' wire, wire goods, perforated metals, electrically welded fabric, welded sheathing, wire fancing, ornamental wire and iron. In addition to the administrative offices at Worcester there are factories at Worcester, Clinton and Palmer. Branch offices and warehouses are located at Boston, Providence, New York, Philadelphia, Chicago, Tulsa and San Francisco.

## NEWS OF THE SOCIETIES

(*Continued from page 112*)

zone idea and approved its principles. The free zone plan asks for federal authorization of the organization of zones in ports, in which areas goods imported could be manufactured or handled in any way and re-exported without payment of customs.

William Kent, member of the United States Tariff Commission, explained proposed legislation to bring about the free zone plan, including the Sanders-Sheppard bill.

The constitution adopted provides for a board of directors of fifteen, composed of representatives of members, seven from the Atlantic region (at least one from the southeast Atlantic); three from the Pacific and five from the region between the Lakes and the Gulf.

Campaigns are to begin at once, about $10,000, at least, being needed for the first year's work. Headquarters will be in Washington.

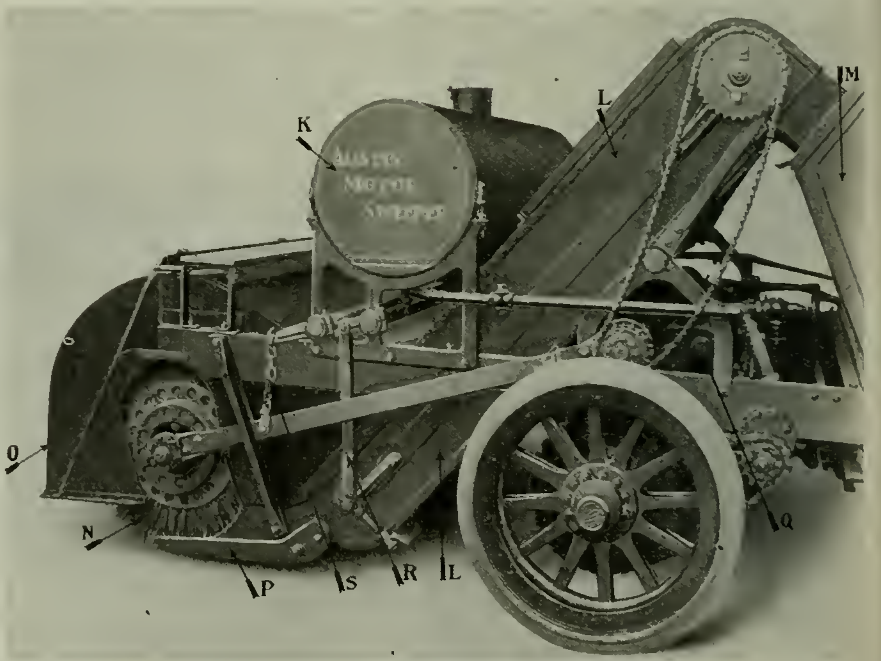
The following officers were elected: President, Arthur McGuirk, New Orleans; vice-president, Lucius R Eastman, chairman, committee on foreign trade, Merchants' Association, New York; directors, J. J. Dwyer, San Francisco Chamber of Commerce; Charles G. Edwards, Savannah Board of Trade; William G. Garland, Los Angeles Chamber of Commerce; William O. Hempstead, Philadelphia House, Chamber of Commerce, and also Board of Trade; T. S. Lippy, Seattle Chamber of Commerce and Commercial Club; A. M. Lockett, New Orleans Association of Commerce; Austin W McLanahan, Baltimore Export and Import Board of Trade and Merchants' and Manufacturers' Association; R. Goodwin Rhett, Charleston Chamber of Commerce; Semmes Steele, Galveston Chamber of Commerce.

## PERSONALS

Lotter, H. H., has been appointed by the Bureau of Public Roads resident engineer of Missouri, with office in Jefferson City.

Palmer, J. G., has been appointed city engineer of Kewanee, Ill. He was previously assistant engineer, Department of State Engineer and Surveyor of New York, and United States junior engineer, Corps of Engineers, United States Army.

Ash, L. R., city manager, Wichita, Kan., has resigned to re-establish his connection with Harrington, Howard & Ash, Kansas City. The resignation is to take effect not later than October 1.



AUSTIN STREET SWEEPER (Sweeping end view)
K. water tank—L. elevator, or conveyor housing—M. dirt receptacle or hopper —N. broom—O, broom housing—P, dust pan—Q. water pump for spray —R. rod to raise or lower conveyor—S, rod and chain to raise and lower broom.

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City County State

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**Information Bureau**

*The Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.*

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## CITY PLANNING FOR UTILITY.

For ten years or more we have been urging that city planning be conducted with utility and not adornment as its chief aim, and an effective street plan rather than a magnificent civic center as its typical result. This view has been gaining ground and we had the pleasure a few days ago of reading a city planning report for Portland, Oregon, in which the subject of a civic center was not even referred to, but "promoting public convenience" and "safety from accident and fire," "effecting economies in transit and transportation," "promoting health and making life more wholesome and the city more beautiful," "stabilizing property values," and "saving public funds" were named as the principal aims of the commission.

Moreover, the subject was approached in the scientific rather than the artistic manner. A careful study was made of the population, housing, business, rapid transit, finances and other conditions and needs of the city, with a view to developing a comprehensive plan for securing the results named.

We cite Portland, not because its report is unique—there have been many others, such as St. Louis', along the same lines—but because it is the latest. It will not be, we are glad to believe, the last city plan having utility as its objective.

## TRUCKS OR HORSES FOR REFUSE HAULING.

The figures given last week and this for the cost of teams and motor trucks used in collecting and hauling refuse seem to add confirmation to the conclusion expressed by many investigators and city officials that motor trucks are economical for long hauls after collection but not for collecting, where stops are frequent and no speed possible. Where the refuse, after having been collected, must be hauled several miles, trucks may be economical for the combined service; the point at which such economy begins will vary with each city.

Few, if any, of the calculations made in this country have considered electric trucks, and it is interesting to learn that in England these have been found more economical than gasoline for collection service. Illustrations of this are furnished by Blackpool (see Municipal Journal and Public Works for July 26), Birmingham (August 2), and Hampstead (in this issue), each of which cities is adopting them as a result of experience in their own and other cities. This may be partly because the current for charging the batteries is obtained from municipal power plants, but a great many American cities have such plants that could be so used.

Refuse collection requires the expenditure of millions of dollars yearly in this country, the present methods are far from satisfactory as to either results or economy, and it is to be hoped that cities generally will give the subject serious investigation with a view to securing improved service and greater economy.

## MUNICIPAL TUNNELING HAS BECOME COMMONPLACE.

Probably every reader of this paper can remember when the first transit tunnel was completed that connected the island of Manhattan with its neighbors across the river. Then there were public exercises and the daily and technical papers devoted pages to the event and what it meant to New York.

What it did mean and the rapidity with which the developments that it forecast have matured is indicated by the fact that on August 7th a tunnel under the East river was completed so far as excavating is concerned, and few daily papers even mentioned the fact, or did so by a notice so obscure as to be read by very few. And the great majority of those who learned that the "north tube of the Fourteenth street rapid transit tunnel" was completed, have any idea whatever of the part it is to play in the city's rapid transit system.

The present generation has seen the development of under-ground construction of all kinds brought to a point undreamed of twenty-five years ago. Not only in methods and results, but in speed, has the development been little short of marvelous. In the case of this tunnel, where a large part of the work was done under 39 pounds air pressure, the work was carried on continuously, day and night, in eight three-hour shifts.

Carrying streets through hills instead of over or around them also is becoming common. On both the Atlantic and the Pacific coasts, cities are adopting this as a standard procedure. In its recently issued report, the city planning commission of Portland, Oregon, advises that several tunnel streets be included in the street layout for the city.

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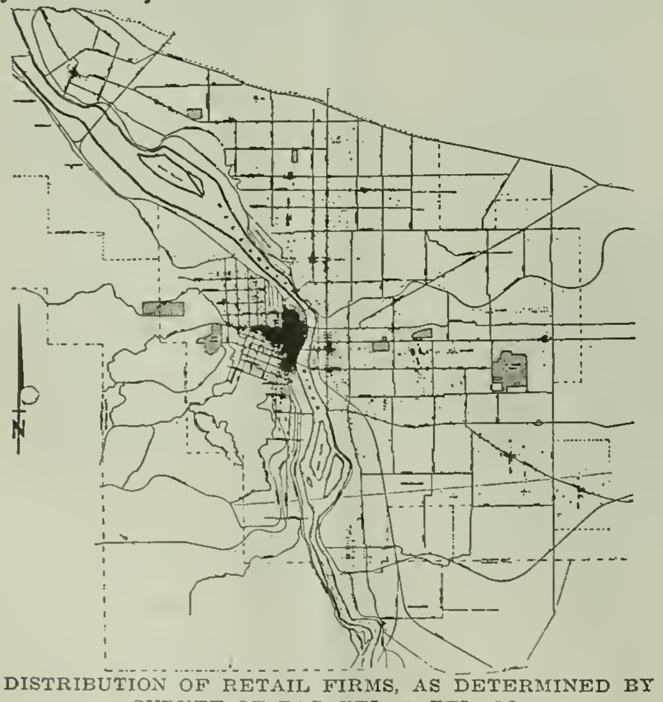
# CITY PLANNING FOR PORTLAND

### Commission, Organized Seven Months Ago, Has Prepared Zone Plans for Several Districts—Zoning the First Step, to Be Followed by Street Planning—Use, Height and Area Districts Classified.

A city planning commission was organized in the city of Portland, Ore., on January 29, 1919, and has just published its first bulletin. It had been preceded by a housing survey committee which was appointed by the city council in September, 1918. Charles H. Cheney, who had been consultant to this committee, was made consultant to the city planning commission. The commission consists of a president, vice-president and secretary, seven other citizens appointed by the mayor, and the mayor, city attorney and city engineer serving ex officio.

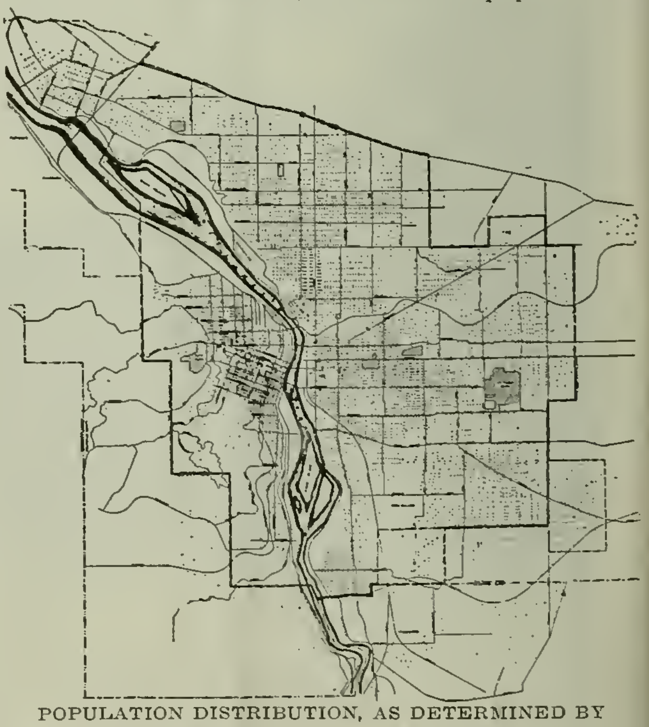
The bulletin just published is intended to give the citizens an outline of the reasons for zoning the city and also a summary of the results of the housing survey and of the findings of the city planning commission up to June of this year.

One of the interesting points relative to city planning that is brought out in this bulletin is the fact that a private company, the Pacific Telephone and Telegraph Company, had recognized the value of an accurate and thorough survey of conditions in a city as a basis for planning the future development of its enterprise. If this is the case with a private corporation, whose interests are limited to one feature of development only, how much more valuable and important must a complete survey be for the city, which is interested and vitally concerned in all lines of development, including those of the public utilities. The company named spent a great many thousand dollars in 1918 making a survey of Portland to obtain fundamental data on which to base its investments in switchboards, conduits and equipments dur-



DISTRIBUTION OF RETAIL FIRMS, AS DETERMINED BY SURVEY OF PAC. TEL. & TEL. CO.

Each dot represents two firms. Includes retail stores, drug stores, offices, groceries, markets, amusement places, lodge rooms, garages and stables. Shows natural business centers that have grown up about a half-mile apart throughout the city.



POPULATION DISTRIBUTION, AS DETERMINED BY SURVEY OF PAC. TEL. & TEL. CO.

Each dot represents ten families. 15,184 families west of Willamette river average 6.3 persons per family. 42,283 families east of river average 4.2 persons per family.

ing the next twenty years. The results of this survey were generously placed at the commission's disposal by this company, and the commission in this report thanks the company therefor in behalf of the city. Some of the results of the survey made by the company are shown graphically by the accompanying illustrations, one indicating the distribution of population densities and another the distribution of minor business centers throughout the city.

The commission believed that practical work on an ultimate plan required it to act as the co-ordinating agent of city development, in carrying out which it called into conference the County Commission, the Dock and Port Commission and the Chamber of Commerce. Conferences with the executives of these bodies are under way to secure, if possible, an agreement for handling the several divisions of the planning program so that the work of the commission may be most effective, in closest cooperation with the other commissions, and without overlapping.

The housing survey committee, in conducting its investigation last fall, sent out a questionnaire in October, the replies to which gave many suggestions of manufacturers and industrial heads. The manufacturers, for instance, generally agreed that concentration of like kinds of business together would prove profitable, and that there should be at least two classes of industrial districts, one for ordinary manufacturing and the other for those plants which give off offensive odors, smoke or noise. In reply to other questions in the questionnaire, many industries reported that they had located in Portland because of the contented labor conditions; which conditions have been unsettled recently by the great influx of labor, and the matter of housing must receive serious and immediate attention if this attraction to industry is not to be lost.

### ZONING IS FUNDAMENTAL.

The commission believes that zoning is the first step and fundamental to all the other proposed moves of the commission. The reasons for zoning are summarized as follows:

To stabilize and protect property values and investments.

To protect the maintenance of the home and of home neighborhoods.

To offer a safe district in which industries may be located without protest and with every facility to do business.

To prevent undue congestion of population.

To insure better sanitary conditions, providing minimum requirements for light and air.

To simplify the problem of street traffic regulation.

To make possible a sensible and more practical street paving program for the future.

To render possible greater economies in paving city streets through a decrease in the width of roadways, where sizes and number of buildings are limited.

To insure the permanence of character of districts when once established.

To prevent the scattering and intrusion of any inappropriate and destructive uses of buildings which deteriorate and decrease property values.

Finally, to make the city a more orderly and convenient place in which to live and work.

It is considered that three kinds of districts should be established, known as "use districts," "height districts" and "area districts."

*Use districts* would be as follows:

*Residence Districts*, for

Class (1) Single-family dwellings only.

UNWISELY LOCATED STORE.
This store was vacant for six years because there was no traffic at this point to support it. It depreciated the value of neighboring property for residence purposes.

Class (2) Dwellings, flats, clubs, dormitories, apartment houses, hotels without stores, and railroad shelter stations.

*Business and Public Use Districts*, for

Class (3) Retail businesses, trades and professions, including residences of classes (1) and (2).

Class (4) Schools, public and semi-public buildings, churches, playgrounds, greenhouses and nurseries, parks, and including single-family dwellings.

Class (5) Retail businesses of class (2), plus public garages, dyeing and cleaning, undertaking parlors, wholesale businesses, oil supply stations, and including any residence, business or public use of classes (1) (2), (3) and (4).

Class (6) Hospitals, sanitariums, charitable institutions, and including any kind of residence of classes (1) or (2).

*Industrial Districts*, for

Class (7) Ordinary, not obnoxious, factories, warehouses and industries, including any business use.

Class (8) Obnoxious and odor-producing factories, including any kind of business use.

The *height districts* which seem to be necessary for Portland are 2½-story districts, 4-story districts, 6-story districts and 8-story districts. The first to have a height of not more than 35 feet from the curb to the finished ceiling line of the attic floor; the buildings in the 4-story districts to have a height not exceeding 50 feet, those in the 6-story district not exceeding 70 feet, and those in the 8-story district not exceeding 90 feet.

Two classes of *area districts* seem to be necessary, which are called A districts, in which the rear yard has a minimum depth at any level equal to one-third the height of the building, and each residence covers not more than 65 per cent of the lots; and B districts, in which all buildings are detached, rear yards have a minimum depth of five-twelfths of the height of the building, and each residence covers not more than 50 per cent of the lot.

It is proposed to apply all of the above restrictions to new buildings only, existing buildings and uses not being affected.

Fundamental principles as a basis for zoning are stated as follows:

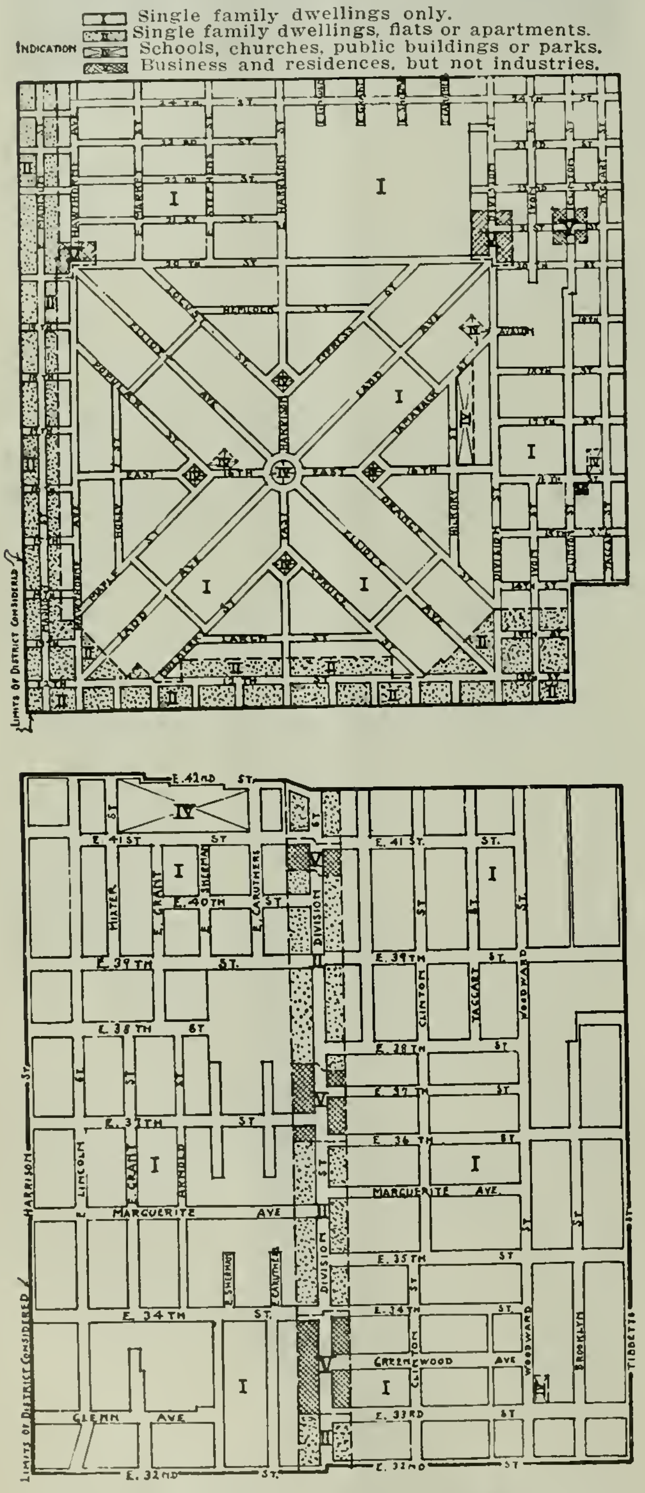
Provisions for ample light and air is a prime essential in building regulations.

Districts should be of any size advisable to meet local conditions—as small as a single lot in some cases.

In each section of the city the building regulations should be adapted to the special requirements of that section.

In general, the two sides of a street, block by block, should be made in the same class of district, and the dividing line of districts should come down centers of blocks rather than in the centers of streets.

As a general rule, it is desirable to treat all buildings on both sides of a street in a given block according to a uniform regulation. There should be a substantially uniform contribution from each owner to the light and air of the block. Block ventilation is essential to well-ordered development. Rear yards should be required wherever buildings come back to back. Over-high buildings are a menace in business districts, as they cut off the light and air of their neighbors, cause undue street congestion which may interfere seriously with the movement of fire apparatus and endanger the occupants of high office and loft buildings.



TYPICAL NEIGHBORHOOD ZONING RECOMMENDATIOINS.
These are subject to public hearing and amendment before being finall recommended to the city council.

The Oregon state zone act provides that "reasonable consideration should be given, among other things, to the character of the district, its peculiar suitability for building uses, the conservation of property values, and the direction of building in accord with a well-considered plan."

Among the data already collected are figures concerning the heights of buildings of different types in the city. The figures do not yet cover the entire city but are believed to be typical of it all. A map of the city has been made into a property map by locating on it every building and indicating the uses of the individual buildings by different colors, fourteen colors being used for this purpose. Such a map makes the natural centers and zones which have developed without regulation stand out clearly.

The figures collected show that 82.4 per cent of the buildings are single-family dwellings; 5.6 per cent are flats, apartment houses, hotels, clubs, etc.; 6.2 per cent are stores, restaurants, offices, theatres, etc.; 4.4 per cent are industries, stations, warehouses, docks, stables, etc.; 0.9 per cent are public buildings, schools, churches and the like; 0.4 per cent are public garages and greenhouses, and 0.1 per cent are hospitals and charitable institutions.

Classified according to the number of stories in the building, 97.4 per cent are 2½-story and under, 1.7 per cent are 3-story, 0.5 per cent are 4-story, 0.16 per cent are 5-story, 0.10 per cent are 6-story, and 0.14 per cent are over 6-story. Of 32,651 single-family dwellings, only eight are more than 2½-story. Of 74 hospitals and charitable institutions, only nine are more than 2½-story. In each height class of buildings, by far the largest number are 2½-story or under, these amounting to more than 80 per cent of each class.

### USE OF DIAGRAMS AND MAPS.

The commission believes that, before any practical plans can be attempted, it is necessary to compile data which will give a true index of the tendencies of growth of the city. The most important findings of the commission are being entered in graphical form on maps and diagrams. Among the operating methods of the commission is the preparing of zone schemes for neighborhoods as units and then submitting these to the several neighborhoods for consideration and recommendations of changes. The maps and diagrams referred to are used at the neighborhood zoning meetings and in conference between the commission and city officials and individuals.

Two preliminary zoning diagrams are shown herewith which have already been approved by a neighborhood committee and later by a general neighborhood meeting. One of these, for instance, was approved by a neighborhood committee on March 19th and by the neighborhood meeting on March 22nd. These preliminary diagrams, when all have been approved by their respective neighborhoods, are subject to public hearing and amendments before the final zone plan is recommended to the city council. The general zone plan for the city, as recommended for adoption by the city council, will consist of a combination of neighborhood zoning diagrams similar to these, covering all sections of the city. It is proposed, after general public hearings on the entire zoning scheme, to adopt the entire zoning map by ordinance.

*(To be continued)*

# HORSES VS. MOTOR TRUCKS IN REFUSE COLLECTION.*

### Cost Figures of Operating and Maintaining Motor Trucks in Chicago, Los Angeles, Detroit, Rochester, Philadelphia and Elsewhere.

In a report by the Efficiency Division of the Chicago Civil Service Commission made public in July, 1915, it is stated that after a thorough study of the question of motorizing Chicago's collection equipment the continued use of horses in garbage collection was found to be justified. The report states that the data assembled for gas and electric trucks warrant their adoption only for hauling after horse-drawn carts have made the house-to-house collection. These figures are based on a $5.50 daily wage per team. If the cost of teaming were increased to $6.00 per day, it is stated that there would be a slight saving by using motor equipment, but this would not be sufficient to warrant the change at least for some time to come. The report states that the haul in Chicago varies from 1½ to 5 miles. As between the gasoline and electric trucks, the latter were found to be the more economical. The haul below which a three-ton electric truck would not be economical when measured against a $5.50 team it was found to be 1.8 miles. Against a $6.00 team it was 0.8 mile. Three-ton gasoline trucks were found to be not as economical as either a $5.50 or $6.00 team.

The fixed and mileage charges for gasoline and electric trucks were as follows:

| Item | Total Cost<br>Gasoline | Electric |
|---|---|---|
| First cost of 3-ton truck or tractor.. | $4,000.00 | $4,000.00 |
| Fixed Charges: | | |
| Fixed charges on investment per year at 4%...................... | 160.00 | 160.00 |
| Garage .......................... | 300.00 | 300.00 |
| Insurance (fire and liability)...... | 190.00 | 183.00 |
| State license ..................... | 4.00 | 4.00 |
| Driver ........................... | 960.00 | 960.00 |
| Obsolescence, 5% ................ | 200.00 | 200.00 |
| Contingencies (interest on operating stores, general superintendence, etc.), 2%................. | 80.00 | 80.00 |
| Total fixed charges per year.... | $1,894.00 | $1887.00 |
| Total fixed charges per day (1/300 yr.) ..................... | $6.31 | $6.29 |
| Variable Expenses per Mile: | | |
| Depreciation ..................... | $0.0473 | $0.0340 |
| Tires ............................ | .0600 | .0600 |
| Maintenance and repairs .......... | .0300 | .0300 |
| Luhrication (oil and grease)...... | .0050 | .0050 |
| Energy (gasoline 13½ cents per gallon, electricity ½ cent per kw. hr.) ........................ | .0344 | .0050 |
| Total variahle expense per mile.. | $0.1767 | $0.1340 |

The cost for hauling with horses was given as follows:

| Item | Teams Costing<br>$5.50 per day | $6.00 per day |
|---|---|---|
| Fixed charges for equipment. | $0.021 | $0.021 |
| Horses and driver .......... | 5.500 | 6.000 |
| Wagon depreciation, life 22,000 miles ..................... | 0.084 | 0.084 |
| Maintenance and repairs at 5% ...................... | 0.021 | 0.021 |
| Total daily expense........ | $5.626 | $6.126 |

In Los Angeles, motor trucks are used in the collection of all non-combustible refuse. Two 2½-ton trucks are used to haul garbage from the outlying districts where the haul averages eight miles or more. One driver and two helpers compose the crew and two loads are collected daily. For the remainder of the city on the shorter hauls, teams are still used. The cost of garbage collection with motor trucks on the long hauls is given as $2.76 per ton. On the shorter hauls the cost is $2.00 per ton using teams.

A certain firm in Rochester employing both horses and motor trucks in lumber and building material deliveries states that the economical low limit of haul for motor trucks is found to be 2¼ miles. The average cost of truck operation by this firm for the last three years has been $11.20 to $12.30 per day. (This includes the cost of two 3-ton and two 2-ton trucks.) Items included are fuel, lubricants, tires, repairs, license fee, liability insurance, garaging, drivers' wages and depreciation. Drivers were paid $17 to $19 per week. Twenty per cent was allowed for depreciation.

Mr. C. V. Montgomery who has charge of a large fleet of motor trucks on paving work in Philadelphia, in a statement appearing in the Engineering News of January 11, 1917, places the cost of operating a 5-ton truck 50 miles per day at $17.91. Fixed charges amount to $5.39 per day or 30 per cent of the total. This cost evidently applies to 1916 conditions. The distribution is as follows:

| Fixed charges | Per day | Per cent of total cost per day |
|---|---|---|
| Depreciation* ($4,100 first cost—$400 scrap value/1200 days).... | $0.46 | 2.6 |
| Insurance (liability, fire, collision) ......................... | .58 | 3.2 |
| License fee ..................... | .10 | .6 |
| Truck foreman (supervising 3 trucks) ..................... | 1.25 | 7.0 |
| Driver ......................... | 3.00 | 16.7 |
| Total fixed charges ........... | $5.39 | 30.1 |

| Variable charges | Per mile | Per day at 50-truck-miles | Per cent of total cost per day |
|---|---|---|---|
| Depreciation* ($4,100 first cost—$400 scrap value /15,000 mi.) ............ | $0.0629 | $3.14 | 17.6 |
| Gasoline at 25 cents (3 mi. per gal.) ............... | .0833 | 4.17 | 23.3 |
| Lubricating oil (64 mi per gal.) .................. | .0055 | .27 | 1.5 |
| Tires .................... | .0386 | 1.94 | 10.8 |
| Repairs .................. | .0600 | 3.00 | 16.7 |
| Total variable charges.. | $0.2503 | $12.52 | 69.9 |
| Fixed charges (at 50 mi. per day) ............ | .1078 | 5.39 | .... |
| Total cost per mile..... | $0.3581 | ...... | .... |
| Total cost per day...... | ...... | $17.91 | 100.0 |

*About 15 per cent of first cost depreciates with passage of time, while about 85 per cent is proportional directly to mileage run.

The cost of operating a 5-ton truck used in the delivery of sand and gravel on the Pacific coast during a five-months period in 1917 was approximately $13.40 per day. This includes all charges. Capacity loads were hauled an average distance of 6.1 miles over roads of various kinds, equally divided between gravel and dirt, with many hills, some of them steep. The average distance traveled daily was about 60 miles. The costs were distributed as given in the table on page 120.

The cost of hauling paving materials in Detroit with a 5-ton truck during 1917 was $14.85 per day, including all costs. The truck hauled an aggregate of 35 tons in seven trips, the average haul being 4½ miles.

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*Concluded from page 111.

Note: In the previous installment of this article, in the table at the foot of page 110, the following errors appeared: 7th column, 4.402 should be 0.402; 8th column, $02.525 should be $0.2525.

**Cost of Operating Five-Ton Truck on Pacific Coast.**

| Item | Total cost | Per cent of total |
|---|---|---|
| Fuel | $303.25 | 18.1 |
| Oil and grease | 69.79 | 4.2 |
| Tires | 154.93 | 9.3 |
| Repairs and parts | 21.06 | 1.3 |
| Wages | 508.75 | 30.4 |
| Interest at 8% | 218.78 | 13.1 |
| Depreciation at 20% | 394.66 | 23.6 |
| Total | $1671.22 | 100.0 |

The cost of operating a 3½-ton truck under average service conditions on the roads of Southern California over a considerable period of time was found to be $9 per day. This includes all cost of upkeep, supplies, depreciation, wages of drivers, etc. The first cost of the truck was placed at $3,500 and its life at ten years, assuming that the truck traveled 25 miles per day. Gasoline was purchased at 16 cents per gallon and the drivers' salary was $960 per year. Roads were good and operating conditions generally very favorable. Itemized costs (for the estimated life of ten years) follow:

| Item | Total cost | Cost per day | Per cent of total |
|---|---|---|---|
| Insurance | $1,350 | $0.45 | 5.0 |
| License and taxes | 380 | .13 | 1.4 |
| Interest at 6% | 2,100 | .70 | 7.8 |
| Depreciation | 3,500 | 1.17 | 12.9 |
| Administration | 415 | .14 | 1.5 |
| Storage | 960 | .32 | 3.5 |
| Gasoline at 16 cents per gallon | 2,400 | .80 | 8.9 |
| Oil, grease, waste | 750 | .25 | 2.8 |
| Tires (less first cost) | 2,345 | .78 | 8.7 |
| Driver's salary | 9,600 | 3.20 | 35.5 |
| Maintenance | 3,250 | 1.08 | 12.0 |
| Total for life of truck | $27,050 | $9.02 | 100.0 |

The first cost of a truck with a collection body would be somewhat higher than is here given. As a matter of fact, the city of Rochester awarded a contract to the Selden Motor Vehicle Company in December, 1917, for two 3½-ton trucks each equipped with a special 6-yard collection body at $5,031.35 each. Other costs also have increased proportionately since the above estimate was made. It is believed, however, that a competent driver could be employed at less than $960. It should be possible to employ a truck driver at $900 annually if he were given permanent employment. Also interest rates on the investment should not amount to more than 5 per cent. The life of a truck used in house-to-house collection work would probably not be as long as in other work, due to frequent starting, stopping and generally hard usage. A life of five years with a daily average mileage of 25 miles would seem to be a fair estimate for the useful service derived from the truck. At the end of that time the estimated scrap value would be $500. With these data the following estimate is made of the daily cost of operating a truck in ash collection:

**Estimated Daily Cost of Operation of a 3½-Ton Motor Truck in Refuse Collection.**

| Fixed charges: | | Total daily cost | Per cent of total |
|---|---|---|---|
| Depreciation: First cost, $5031.35, life 5 years, scrap value $500 | | $0.45 | 3.5 |
| Insurance (liability $120, fire $45 per year | | .55 | 4.3 |
| Storage | | .30 | 2.4 |
| Driver ($900 per year) | | 3.00 | 23.6 |
| Interest (5% annually) | | .84 | 6.6 |
| Overhead supervision (same organization as for city stables) | | .40 | 3.2 |
| Total fixed charges | | $5.54 | 43.6 |
| Variable charges: | Per mile | Per day at 25 miles | Per cent of total |
| Depreciation: First cost $5,031.35, life 5 years, scrap value $500 | $0.1027 | $2.57 | 20.2 |
| Gasoline at 22 cents/gallon (3 mi. per gallon) | .0733 | 1.83 | 14.4 |
| Lubricants (oil, grease, waste) | .0100 | .25 | 2.0 |
| Tires | .0500 | 1.25 | 9.9 |
| Repairs and sundries | .0500 | 1.25 | 9.9 |
| Total variable charges | $0.2860 | $7.15 | 56.4 |
| Total fixed charges at 25 mi. per day | .2216 | 5.54 | 43.6 |
| Total daily cost of operation | $0.5076 | 12.69 | 100.0 |

It is assumed that a certain small amount of depreciation is due directly to the passage of time. In the estimate, therefore, 15 per cent of the total depreciation is included as a fixed charge and distributed over 1,500 days, the estimated useful life of the truck. The remaining 85 per cent depreciation is assumed as being directly proportional to the mileage run. Operated 25 miles per day with a life of 1,500 days' service, the total distance that the truck would travel would be 37,500 miles. The estimated depreciation for the life of the truck on this basis is 23.7 per cent of the total daily cost of operation. This is rather a big allowance for depreciation, but when the nature of the work is considered it is not high in comparison to depreciation of trucks used in straight commercial hauling work. A truck used in house-to-house collection work must be started and stopped many times in the course of each loading. The motor must be kept in constant motion because each stop is of short duration. On account of the many starts and stops also the truck must of necessity cover a considerable distance each day at a speed much slower than its economical speed of operation. Combined with all of these factors the truck must be operated continuously in the presence of grit and cinders from ashes and dust from street dirt. For these reasons not only is depreciation sure to be high, but the unit cost of fuel, lubrication, tires and repairs is also bound to be more than similar costs under normal commercial operating conditions.

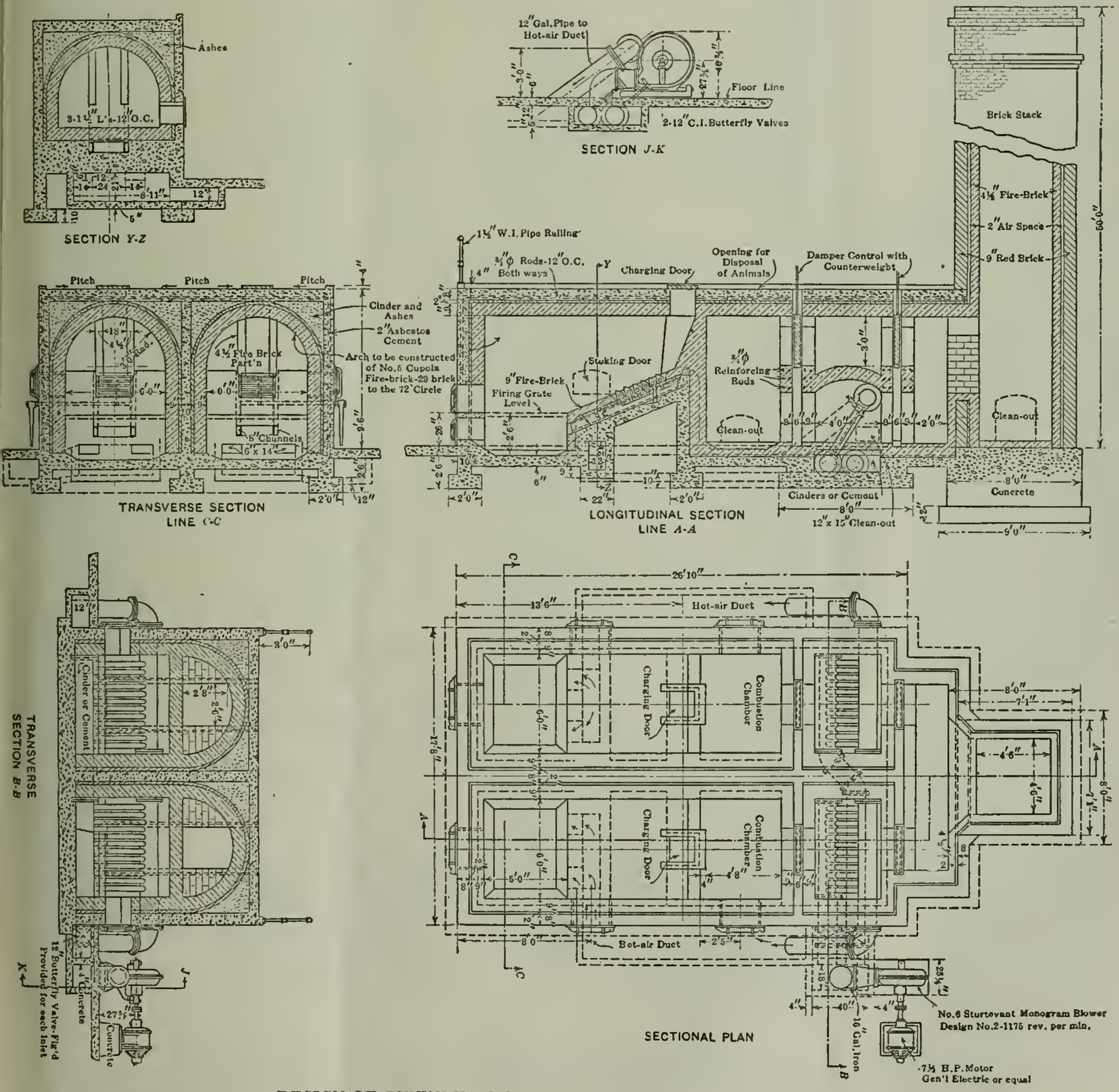
## INCINERATORS USED AT CANTONMENTS.

### Details of Design Prepared by Construction Division of Army for Camp of Twenty Thousand Men.

During the season of 1918 the Construction Division of the army prepared designs for incinerators for destroying animal and vegetable wastes that had no commercial value and that were not removed by contractors from the transfer stations. The transfer station was designed in the form of an ell. One wing consisted of a platform for receiving the refuse collected, another platform delivering material into cars on a railroad siding, and between these a covered shed with partitions for storing cans, bottles, paper, etc., a paper baling press and sorting spaces. The other wing contained a receiving platform and transfer platform for garbage, and a room containing the soaking tank and spraying tank for cleaning the cans. At the intersection of these two wings was placed an incinerator for the purpose previously stated.

The incinerator was designed with the idea of providing ample firing and combustion chambers, a grate surface capable of burning 35 pounds per square foot per hour under natural draft with a chimney 50 feet high, or 60 pounds per square foot per hour with forced draft, provision for which also was made. There was also a drying hearth, the purpose of which was to allow the liquids to drain off before the material reached the grate and thus facilitate the burning. There were furnished dampers to control the draft, ample stack area to prevent back-firing and produce an average velocity of the gases of approximately 20 feet per second.

In determining the capacity of the incinerator for a given camp, it was assumed that the quantity of material to be incinerated would be one ton per day for each thousand men, the incinerator being operated eight hours per day. For a camp of 20,000 men, this would require a 20-ton incinerator. The accompanying illustration shows the details of an incinerator of this size. The longitudinal section shows the charging door through which the material was dropped onto the drying hearth, through which the liquid escaped and was discharged under the grate. The stoking door at the side was used for working the dried material down onto the grate. On their way to the chimney, the hot gases were used to heat the air in an economizer, which air was conducted through hot-air ducts to the ash pit under the firing grate. In order to furnish forced draft when necessary a blower was provided, driven by a 7½ h.p. motor. The draft was controlled by two dampers provided with counterweights, one on each side of the economizer chamber. Between the economizer chamber and the grate chamber was a combustion chamber 4½ feet long and the full width of the unit. (This 20-ton incinerator consisted of two units.) The total length of the double unit was about 40 feet in the clear, and the width 17 feet 6 inches. From the firing-room floor to the charging floor above the incinerator was 9 feet 6 inches.



DESIGN OF TWENTY-TON INCINERATOR FOR CANTONMENTS.

The chimney was of brick, 7 feet 1 inch square on the outside and 4 feet 6 inches on the inside; the outside being built of 9 inches of red brick, the inside being lined with 4½ inches of fire brick, and there being a 2-inch air space between the two.

The bin for fuel and combustible refuse used in the incinerator was between the incinerator building and the railroad siding, the top of the bin being about four feet above the level of the railroad track and the bottom about four and a half feet below such level, the latter being also the level of the firing floor. The incinerator was enclosed within concrete walls and covered with a corrugated iron roof supported by steel trusses and provided with a ventilator.

# WATER RATES AND FIRE PROTECTION CHARGES

## Data from Several Hundred Cities of the United States—Maximum and Minimum Rates—Changes Since Before the War—Receipts for Public Hydrants and Private Fire Protection.

### METER RATES AND FIRE PROTECTION (Continued).

| City and State. | Municipal or Private. | Maximum Meter Rates. | | Minimum Meter Rates. |
|---|---|---|---|---|
| | | Rate. | For consumption less than | |
| **Pennsylvania** (Continued) | | | | |
| Lock Haven | Municipal | 4c. per M | Straight | ........ |
| Meadville | Municipal | 5c. | 10,000 cu. ft. | ........ |
| Media | Municipal | ........ | ........ | ........ |
| Minersville | Private | 20c. per 100 cu. ft. | 1,001 cu. ft. per month | 6c. per 100 cu. ft. |
| Mount Union | Municipal | 50c. per M | 4,001 per month | 7c. per M |
| New Kensington | Private | 22c. per M | ........ | ........ |
| Rankin | Municipal | 17c. per 100 cu. ft. | 501 cu. ft. | 13c. per 100 cu. ft. |
| Sewickly | Municipal | 30c. per M | 10,001 | 10c. per M |
| Shamokin | Private | 20c. per 100 cu. ft. | 1,001 cu. ft. per month | 4c. per 100 cu. ft. |
| Shenandoah | Municipal | 15c. per M | 6,691 per month | 10c. per M |
| Susquehanna | Private | 40c. per M | 50,001 | 15c. per M |
| Tamaqua | Municipal | 25c. per M | 12,001 | 4½c. per M |
| Tyrone | Private | 10c. per M | 1,001 per day | 2c. per M |
| Uniontown | Private | 25c. per M | 50,001 | 10c. per M |
| West Newton | Private | 50c. per M | 20,001 per quarter | 11c. per M |
| Wilkinsburg | Private | 20c. per 100 cu. ft. | 10,001 per month | 6c. per 100 cu. ft. |
| **South Carolina:** | | | | |
| Charleston | Municipal | 18½c. per 100 cu. ft. | 10,001 per quarter | 4½c. per 100 cu. ft. |
| Cheraw | Municipal | 37c. per M | 3,001 per month | 10c. per M |
| Clinton | Municipal | 40c. per M | 1,001 | 10c. per M |
| Rock Hill | Municipal | 27c. per M | 10,001 per month | 10c. per M |
| **South Dakota:** | | | | |
| Aberdeen | Municipal | 20c. per M | 15,001 per 6 months | 6c. per M |
| Rapid City | Municipal | 25c. per 100 cu. ft. | 1.201 cu. ft. per quarter | 7½c. per 100 cu. ft. |
| **Tennessee:** | | | | |
| Clarksville | Municipal | 35c. per M | ........ | 10c. per B |
| Dyersburg | Municipal | 25c. per M | 5,001 | 15c. per M |
| Fayetteville | Municipal | 40c. per 100 cu. ft. | ........ | 8c. per 100 cu. ft. |
| Franklin | Municipal | 30c. per M | 2,001 | 20c. per M |
| Knoxville | Municipal | ........ | ........ | ........ |
| Memphis | Municipal | 24c. | 2,501 | 10c. |
| Union City | Municipal | ........ | ........ | ........ |
| **Texas:** | | | | |
| Cleburne | Municipal | (f) | ........ | ........ |
| Ennis | Municipal | 40c. per M | 10,001 | 12c. per M |
| Hillsboro | Municipal | 35c. per M | ........ | ........ |
| Longview | Municipal | 45c. per M | 10,001 | 12c. per M |
| Port Arthur | Municipal | 30c. per M | 5,001 | 13c. per M |
| Temple | Municipal | 50c. per M | 6,001 per quarter | 10c. per M |
| Weatherford | Private | 50c. per M | 30,001 per month | 25c. per M |
| **Vermont:** | | | | |
| Fair Haven | Municipal | 25c. per M | 10,001 | 10c. per M |
| Montpelier | Municipal | 10c. per 100 cu. ft. | 3,001 cu. ft. | 3c. per 100 cu. ft. |
| Northfield | Municipal | 28c. per 100 cu. ft. | 801 cu. ft. per quarter | 22½c. per 100 cu. ft. |
| Richford | Municipal | 15c. per 100 cu. ft. | ........ | 5c. per 100 cu. ft. |
| **Virginia:** | | | | |
| Danville | Municipal | 10c. less 25% | Straight | ........ |
| Fredericksburg | Municipal | 20c. per M | 30,001 | 2c. per M |
| Pulaski | Municipal | 10c. per M | Straight | ........ |
| Richmond | Municipal | 10c. per 100 cu. ft. | 20,001 cu. ft. per month | 5c. per 100 cu. ft. |
| **Washington:** | | | | |
| Centralia | Municipal | ........ | ........ | ........ |
| Crehalis | Municipal | 22½c. | 9,001 | 5c. |
| Ellensburg | Municipal | 13c. | 14,001 | 8c. |
| Hoquiam | Private | 30c. per 100 cu. ft. | 1,201 cu. ft. | 5c. per 100 cu. ft. |
| Olympia | Municipal | ........ | ........ | ........ |
| Port Townsend | Municipal | 60c. per M | 5,001 | 14c. per M |
| Pullman | Municipal | 33⅓c. per M | 3,001 | 20c. per M |
| Seattle | Municipal | 10c. per 100 cu. ft. | 501 cu. ft. per month | 4c. per 100 cu. ft. |
| Spokane | Municipal | 10c. per M | 1,000,001 per month | 5c. per M |
| Walla Walla | Municipal | 20c. per M | 10,001 | 8c. per M |
| Wenatchee | Municipal | 10c. per M | 12,001 | 8c. per M |
| **West Virginia:** | | | | |
| Elkins | Municipal | 20c. per M | 5,001 | 15c. per M |
| Princeton | Private | 50c. per M | 10,001 per month | 13c. per M |
| **Wisconsin:** | | | | |
| Beloit | Private | 12c. per 100 cu. ft. | 10,001 cu. ft. | 1½c. per 100 cu. ft. |
| Columbus | Municipal | 17c. per 100 cu. ft. | 1,001 cu. ft. | 11c. per 100 cu. ft. |
| De Pere | Municipal | 42c. per M | 3,001 | 10c. |
| Eu Claire | Municipal | $1 | 601 | 4c. per 100 cu. ft. |
| Fond du Lac | Municipal | 40c. per M | 40,001 per quarter | 15c. per M |
| Grand Rapids | Municipal | 18c. per 100 cu. ft. | 3,601 cu. ft. per month | 6c. per 100 cu. ft. |
| Green Bay | Private | 24c. per 100 cu. ft | 501 cu. ft. per month | 5c. per 100 cu. ft. |
| Janesville | Municipal | 15c. per 100 cu. ft. | 10,001 cu. ft. per quarter | 2c. per 100 cu. ft. |
| La Crosse | Municipal | 15c. per 100 cu. ft. | 2,001 cu. ft. per 6 months | 3c. per 100 cu. ft. |
| Madison | Municipal | 7¼c. per 100 cu. ft. | 75,000 per 6 months | 4c. per 100 cu. ft. |
| Milwaukee | Municipal | 6c. straight | Inside city | 8c. straight |
| Menomonee | ........ | 90c. per month | ........ | ........ |
| Portage | Municipal | ........ | ........ | ........ |
| Shawona | Municipal | 15c. per 100 cu. ft. | 1,201 cu. ft. per quarter | 5½c. per 100 cu. ft. |
| Stevens Point | Private | 26c. per 100 cu. ft. | 2,001 cu. ft. | 4½c. per 100 cu. ft. |
| Watertown | Municipal | ........ | ........ | ........ |
| **Wyoming:** | | | | |
| Rock Springs & Green River | Private | $1.50 per M | 2,001 per month | 40c. per M |

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(f) Inside the city—family only, $1.50 for 3,000 gal., per quarter; family and bath, $2.25 for 4,500 gals.; family, bath and closet, $3 65 for 5,200 gals.; 20c per 1,000 gals. excess. Outside the city—$1.50 for 2,000 gals. a month; 50c per 1,000 gals. excess.

## METER RATES AND FIRE PROTECTION (Continued).

| City and State. | Minimum Meter Rates For consumption more than | Increase since before the war. | City pays for fire hydrants. | Charge for private hydrants or sprinklers. |
|---|---|---|---|---|
| **nsylvania (Continued)** | | | | |
| ock Haven | ........ | None | Nothing | None |
| eadville | ........ | None | $25 each | None |
| edia | ........ | 50% | Nothing | None |
| inersville | 11,000 cu. ft. per month | None | Nothing | None |
| ount Union | 600,000 per month | None | $25 each per year | $27.75 per year each hydrant; ½c per sq. ft. automatic sprinkler service |
| ew Kensington | ........ | None | $35 each per year | $45 each per year, hydrants; sprinklers, 5c per head |
| ankin | 500 cu. ft. | None | Nothing | None |
| ewickly | 100,000 | None | Nothing | $25 each per year |
| hamokin | 250,000 cu. ft. per mo. | None | Nothing | Hydrants, $20 per year; sprinklers, 4-in., $100, to 8-in., $200 |
| henandoah | 240,000 per month | None | $20 per year | $5 per hydrant; sprinklers, meter rates |
| usquehanna | 1,000,000 | Flate rate discount reduced from 20% to 5% | $320 per year for 32 hydrants | $5 per year |
| amaqua | 5,000,000 | None | ........ | ........ |
| yrone | 100,000 per day | None | $150 per year | Have none |
| niontown | 500,000 | None | $25 each per year | $25 each per year |
| est Newton | 600,000 per month | None | $25 each per year | $20 per month, 6-in. line; others in proportion |
| ilkinsburg | 1,666,666 cu. ft. per mo. | None | $275 per mi. distributing pipe plus $3 each per year | Rate schedule now being prepared |
| **th Carolina:** | | | | |
| harleston | 12,000,000 cu. ft. per quarter | None | $73.33 first 600; all over, $25 | Based upon size of tap |
| heraw | 100,000 per month | 10% | $45 each | None |
| linton | 50,000 | 50% | Nothing | $50 per year |
| ock Hill | 1,000,000 per month | None | $50 each per year | $50 per year; having detector meters installed |
| **th Dakota:** | | | | |
| berdeen | 102,500 per month | None | Nothing | None |
| apid City | 1,200 cu. ft. per quar. | None | Nothing | None |
| **nessee:** | | | | |
| larksville | 3,000,000 per quarter | Assessment rates, 20%; meter rates, 12% | Nothing | Automatic sprinkler system, $50 per year |
| yersburg | ........ | 10% | Nothing | All metered |
| ayetteville | ........ | None | Nothing | None |
| ranklin | 17,000 | None | Nothing | None |
| noxville | ........ | None | $45 per year | $45 per hydrant per year |
| emphis | 400,000 | None | Nothing | $24 per hydrant per year; sprinklers, $36 per year for 600 heads, 1c each for additional head |
| nion City | ........ | ........ | ........ | ........ |
| **as:** | | | | |
| leburne | ........ | Outside city, 50c per mo. | $20 each per year | $20 each per year |
| nnis | 100,000 | None | Nothing | Meter rates |
| illsboro | ........ | 10c per M. gal | Nothing | None |
| ongview | 900,000 | From 35c to 45c minimum | Nothing | None |
| ort Arthur | 5,000,000 | None | Nothing | None |
| emple | ........ | None | Credit each $35 | None |
| Veatherford | ........ | None | $45 each per year | Regular meter rates |
| **mont:** | | | | |
| air Haven | 50,000 | None | Nothing | Have none |
| ontpelier | 200,000 cu. ft. | None | Nothing | None |
| orthfield | 800 cu. ft. | None | $30 per year | $30 |
| ichford | ........ | None | Nothing | None |
| **ginia:** | | | | |
| anville | ........ | None | $20 per year | None |
| redericksburg | 10,000,000 | None | Nothing | Regular meter rates |
| ulaski | ........ | None | Nothing | ........ |
| ichmond | 60,100 cu. ft. per month | None | $25 each per year | Meter rates |
| **shington:** | | | | |
| entralia | ........ | None | $5 each per month | ........ |
| rehalis | 975,000 | None | $250 per month | $5 to $15 per year, according to size |
| llensburg | 50,000 | None | $5 each per month | None |
| oquiam | 50,000 cu. ft. | Proposed | $30 each per year | $6 for 6-inch service |
| lympia | ........ | None | $34 | ........ |
| ort Townsend | 5,000 | None | Nothing | $5 to $10 per year |
| ullman | 3,000 | None | Municipal plant | None |
| eattle | 30,000 cu. ft. per month | None | $1 each per month | Regular meter rates |
| pokane | 1,000,000 per month | None | $13,000 per year | None |
| Valla Walla | 100,000 | ........ | ........ | ........ |
| Venatchee | ........ | Proposed | $4 each per month | None |
| **st Virginia:** | | | | |
| lkins | ........ | None | Nothing | None |
| rinceton | 150,000 per month | Maximum from 40c to 50c; minimum charge from 67c to $1.00 | $95 each per year | None |
| **sconsin:** | | | | |
| eloit | 200,000 cu. ft. | None | $19,543 per year | 2-inch connections, $25, to 8-inch, $150 per year |
| olumbus | 5,000 cu. ft. | None | $2,600 per year | Metered |
| e Pere | ........ | ........ | $5 each | $40 per year for 4-inch pipe |
| u Claire | 11,000 | None | $15,000 per year | Automatic sprinkling service, 6-inch connection, $20; 2-inch, $10 per year |
| ond du Lac | 800,000 per quarter | None | $64.30 each for first 140; $50 each additional | $35 per year |
| rand Rapids | 72,000 cu. ft. per month | 20% | $2.50 per month | None |
| reen Bay | 100,000 cu. ft. per quar. | From 22c to 24c maximum | $36,000 | 2-inch, $28, to 6-inch, $75 per year |
| anesville | 900,000 cu. ft. per quar. | None | $50 per year | ........ |
| a Crosse | 1,129,000 cu. ft. per 6 months | Surcharge of 5% | Nothing | None |
| adison | 200,000 per 6 months | About 20% | $50,000 for 750 hydrants; pro rata rate for each additional | 4-inch, $20; 6-inch, $50 service charge per year |
| ilwaukee | Outside city | None | $5 each per year | None |
| enomonee | ........ | None | $30 per year | ........ |
| ortage | ........ | ........ | ........ | ........ |
| hawona | 65,000 cu. ft. per month | 20% | $40 per year each | None |
| tevens Point | 100,000 cu. ft. | None | $30 each | ........ |
| Vatertown | ........ | None | Nothing | None |
| **oming:** | | | | |
| ock Springs & Green River | 20,000 per month | None | $40 each per year, Rock Springs; $25 each per year, Green River | None |

# REFUSE COLLECTION AND DISPOSAL IN HAMPSTEAD

### Cost of Collection by Electric Truck—Street Sweepings for Private Gardens—Plant for Screening and Sorting Rubbish.

Hampstead, England, a London borough, is very hilly, the 64 miles of streets having elevations varying from 100 to 441 feet above datum, with grades as high as 12½ per cent. A destructor was used for burning the refuse from 1887 to 1917, when it was sold to an adjoining factory for $35,000; the reason for abandoning it being the long haul, the destructor being more than two miles outside the borough boundaries. As a substitute for burning, O. E. Winter, the borough engineer, designed a plant for screening and sorting the refuse at a site situated centrally in the borough. Until this plant is completed the refuse is being dumped wherever places can be found.

The plant will consist of a rotary screen hexagonal in shape, 5 ft. 6 in. in shortest diameter and 14 ft. long, 8ft. 6 in. having ⅜-inch perforations and the remainder 2-in. perforations. The fine material falls into a pit, from which it is raised by an elevator into railway cars alongside. The material passing through the 2-inch openings is discharged into a washer which separates the fuel from the rubbish. The material that reaches the end of the screen falls onto a picking belt, from which pickers standing along both sides remove metal, bottles, bones and other salable materials. Materials remaining on the belt are discharged into a disintegrator which crushes them and discharges them into the cars that receive the fine screenings. The estimated cost of the plant, including the reinforced concrete building that encloses it, is $33,500. Offers of 12 to 25 cts. per ton at the plant have been made for the screenings.

The first experiment in motor haulage by the borough was in 1901, when two 5-ton dump-body steam trucks were put into service. They were used for ten years, but the upkeep was high and they were not suitable for collecting house refuse. In April, 1918, a 3½-ton electric truck was obtained, costing $5,385. (All prices in this description are changed to dollars on the basis of $5 to one pound sterling.) This is used for hauling house refuse. The battery is charged each night at the borough's generating station, and also a boost up is given it during dinner hour. The cost during May, 1919, was used as a basis of estimating annual cost, with the following results:

| | |
|---|---|
| Depreciation, 10% on chassis (except battery and tires) | $410 |
| Interest at 5% on decreasing capital value, or about 2½% average | 105 |
| Current (say 4,500 miles) at 4 1/6 cts. per kw. hr. | 260 |
| Tires (say two years' life) | 135 |
| Battery upkeep (say three years' life) | 350 |
| Insurance, etc | 100 |
| Driver | 1,000 |
| Repairs, repainting, oil, etc | 100 |
| Garage charges | 50 |
| Total | $2,510 |

The actual work done by this truck has been equivalent to that of three horses and wagons, and it is estimated that the annual saving as compared with hauling by horses will be more than $2,000.

In 1916 the borough changed from contract street cleaning to municipal work, using the patrol system. The sweepings are collected by carts, but the patrol men were instructed to dispose of the sweepings as far as possible for private gardens, and about ten per cent of the sweepings were got rid of in this way without the expense of carting them away. Also, the drivers of the collecting wagons were allowed a bonus of 13 cents a load for disposing of the sweepings collected by them, which they did easily as they were accepted gladly as fertilizer for gardens.

# ALLENTOWN'S CITY FARM AND THE HIGH COST OF LIVING.

In 1916 Allentown, Pa., purchased the Geisinger farm of 480 acres as a site for a sewage treatment plant, with the idea of building a 2½-mile outfall sewer to the farm and constructing there an Imhoff tank plant. Since then the city has changed its plans and arranged to install a "direct oxidation" sewage treatment plant inside the city, making an estimated saving of a million dollars in cost of construction. This left the farm available for other uses.

This "city farm" is now operated by the Department of Parks and Public Property, of which Robert J. Wheeler is superintendent. Of its 480 acres, 200 are wooded and 230 are under cultivation or in grass, 20 being used for sweet corn, 8 for potatoes, 4 for cantaloupes, 8 for cabbages, 2 for lima beans, 1 for cauliflower, and 6 for beets, carrots, cucumbers, spinach, peas and tomatoes. Also 40 acres are in rye, 20 in wheat, 35 in field corn, 93 in sweet clover and alfalfa and 46 in grass.

The products of the farm are sold in the city markets and on the streets at reasonable prices, the result of which has been to materially reduce the price of vegetables as sold by street hucksters and grocers. Farmers coming into Allentown had been wont to demand grocery store prices, but the Park Department now brings to the markets truck loads of fine vegetables and undersell all profiteers. Last July, cabbage sold as high as 16 cents a pounds, but after the city farm had sold 20,000 heads at from 4 cents to 2 cents a pound, prices declined and cabbage is now selling for 4 cents.

The city is now considering the creation of a permanent food department which will concern itself with all problems relating to the food supply of the city. The farm could raise enough truck to supply the city for several weeks if all other sources of supply were cut off. The officials believe that the only practical method of dealing with the problem of unfair prices charged by farmers and dealers, is to use the production of the farm to defend the citizens against them.

The farm is also utilized for raising pigs on city garbage. Twelve hundred dollars' worth of pigs have been sold this year and there are still 110 in the drove. Seventy young pigs have been raised and are being fattened for the fall market. The Park Department intends to sell its pigs retail in the city market when cold weather arrives. The State Live Stock Sanitary Board supervises the drove and all pigs are double treated to protect against cholera. The section of the farm where the pigs are kept has an abundance of sweet clover, running water and shade in every field. The city produces enough garbage to feed 3,500 pigs. At present this garbage is burned at a cost of $14,000 a year.

The officials believe that in this municipal production of food and use of it to keep down prices, it has developed something that will intrest and help the other cities of the state, whose representatives will visit Allentown next week to attend tbe conventioin of the Third Class Cities of Pennsylvania.

# LEGAL NEWS

## A Summary and Notes of Recent Decision—Rulings of Interest to Municipalities

### Sidewalk Construction by Property Owner—Delegation of Council's Power.

(Tex. Civ App.) City ordinance providing for construction of cement sidewalks by the property owner, or, on his default, by the city, under supervision of public improvement committee of city council at owner's expense, held not void as delegation of council's legislative powers. —City of Lampass v. Huling, 209 S. W. 213.

### Dual Capacity of Municipality.

(Kan.) A municipality has a dual capacity, one as an agency of state in which it is vested with powers which are purely governmental, legislative and public, and the other which is proprietary, commercial, quasi private and ministerial.—Rose v. Gypsum City, 179 P. 348.

### Unreasonable Regulation of Streets by City—Interference by Courts.

(Iowa) Where powers are conferred on city council by statute to regulate streets, but manner of performing such powers has not been directed by Legislature, such manner should not be arbitrary or oppressive, and if attempted, the courts may interfere and prevent an unreasonable course by the city in the execution of what it has enacted through its council.—Central Life Assur. Soc. of the United States v. City of Des-Moines, 171 N. W. 31.

### Municipal and State Improvements.

(Ill.) While state may not deprive a municipality of its discretion in incurring expenses for improvements, such municipality cannot stand in the way of the state's exercise of its powers for the preservation of life and the promotion of the public welfare.—Chicago, M. & St. P. Ry. Co. v. Lake County, 122 N. E. 526.

### Council Allowing Higher than Franchise Electric Rate.

(Ark.) Passage by city council of ordinances permitting plaintiff light and power company to charge consumers during the war and for six months thereafter an increased rate over maximum fixed in original franchise was not, in view of Acts 1913, p. 569, § 10, an exercise of police power within section 1 not allowing referendum upon ordinance for exercise of police power.—Terral v. Arkansas Light & Power Co., 210 S. W. 139.

### City Buying Materials from Councilman's Company.

(Iowa) In view of Code 1897, § 668, subd. 14, where a stockholder, director and manager of a corporation, who as a member of a city council, voted to purchase merchandise from the corporation, such contract was contrary to public policy.—Town of Hartley v. Floete Lumber Co., 171 N. W. 183.

Where a stockholder, director and manager of a corporation, as a city councilman, voted to purchase merchandise from corporation, corporation may recover actual value of property received and retained by city, in absence of fraud and concealment.—Id.

### Street Railway Operating Without Franchise.

(U.S.D.C.Ohio) A street railroad, operating without a franchise, is not a trespasser, and it has the right to make reasonable use of the streets in the proper conduct of its business, until it is forbidden to continue by the city authorities, who may impose as an alternative to ejection reasonable conditions.—Henry L. Doherty & Co. v. Toledo Rys. & Light Co., 254 F. 597.

The power of a city to require a street railway company, which was operating without a franchise, to remove from the streets, cannot be questioned in the courts.—Id.

Whether conditions as to the use of streets, imposed by a city upon a street railroad company operating without a franchise, are fair and reasonable, is a subject of judicial inquiry.—Id.

Where a street railroad company is operating without a franchise, and not bound by any contract stipulation, it has a right to demand for its service from time to time, a rate of fare which will secure to it reimbursement for its expenditures properly incurred, plus a fair return on the property employed in performnig the service.—Id.

A street railroad company, operating without a franchise from the city, has a right to cease at once its service and take up its tracks.—Id.

Where a street railroad company was operated without a franchise, the act of the council in imposing conditions which the company refused to accept, does not ipso facto require the company to leave the streets.—Id.

### Ratified Order of Water Meters by Unauthorized Agent—City Responsible.

(W. Va.) A municipality is bound by a contract for purchase of property for it by an unauthorized agent, if, with knowledge thereof, its acts amount to ratification.—Union Water Meter Co. v. Town of New Martinsville, 98 S. E. 516.

A municipality's ratification of a contract for purchase of property for it by an unauthorized agent may be implied either from acquiescence after full knowledge or from subsequent acts and conduct by municipal authorities inconsistent with any other theory.—Id.

Where water meters are sold and delivered to city owning its water plant upon order of one not authorized to act for it, and it thereafter receives them and pays for their installation by order upon its treasury, it thereby impliedly ratifies contract of purchase and is bound by its terms.—Id.

### City's Power to Sell Ice—Not "Public Purpose."

(Mo.) Before a city can legally engage in making and selling ice, it must have charter authority, either express or clearly implied.—State ex rel. Kansas City v. Orear, 210 S. W. 392.

A city, despite charter permission, may not lawfully issue bonds, which must be paid from taxes, to engage in the business of making and selling ice to its inhabitants, the purpose not being "public," to warrant the expenditure of public moneys.—Id.

The common law, even without the aid of any constitutional inhibition, forbids the levying and collecting of taxes by a city for any private purpose or business.—Id.

### Sewer Assessment on Land Which Cannot Be Drained.

(Ore.) Land which is not, and cannot be, drained by a sewer cannot be assessed therefor.—Duniway v. Cellars-Murton Co., 179, p. 561.

Under Portland City Charter, § 389, a property owner cannot be assessed for a sewer unless he receives a special benefit therefrom.—Id.

Under Portland City Charter, § 389, an assessment for a sewer was void, where sewer was laid through private land of another, and landowner could not use it without being a trespasser.—Id.

### Street Railway Franchise—Maintenance of Bridges.

(Mass.) Where aldermen of city, in granting extensions of location to street railway, presumably acted under St. 1874, c. 29, § 11 (Pub. St. c. 113, § 21), as public officers, granting franchises, acceptance of grants subject to conditions as to keeping highway in repair, etc., did not constitute "contract," and any remedy of city to recover cost of repairing a street, bridge, etc., is in equity.—City of Northampton v. Northampton St. Ry. Co., 121 N. E. 495.

City could sue street railroad at law on covenant of latter in instrument and under seal that, so long as railroad should operate certain extensions, it would save city harmless from all loss by reason of construction and operation of extensions.—Id.

Street railroad's covenant to save city harmless from all loss, cost, or damage from construction and operation of extensions of road held comprehensive enough to include an obligation to save city harmless from one-quarter of expense of maintaining bridges on railroad's locations as extended, apart from obligation imposed by law before enactment of statute.—Id.

Condition of street railroad's franchise, or agreement of road to save city harmless from all loss from construction and operation of extensions of road, in so far as additional to burden imposed on road by St. 1864, c. 229, § 18, that is, to keep streets, roads and bridges in repair, held not abrogated by St. 1898, c. 578.—Id.

### Suit for Materials Furnished Sub-Contractor on Contractor's Bond.

(Tex. Civ. App.) Where paving contractor executed bond to secure payment for all labor and material used, materialman was entitled to sue thereon for materials furnished sub-contractor, though principal contractor had no notice of the purchase of such materials.—Fennell v. Trinity Portland Cement Co., 209 S. W. 796.

### Delay in Completion of Contract—Fault of City—Acceptance.

(Ore.) Where a contract for street paving provided that the improvement should be completed by a specified date, the contract did not expire, notwithstanding the improvement was not completed in time, where the delay was caused by the action of the city in refusing to permit it before the installation of other improvements, and extensions had been allowed by the council; the contract containing no provision for automatic forfeiture.—Irelan v. City of Portland, 179 p. 286.

Where the completion of a public improvement was delayed by the action of the city itself, and time for performance extended by the council, the city executive board did not lose jurisdiction to accept the improvement merely because it was not completed at the time appointed in the contract.—Id.

### Breach of Contract—Loss from Sub-Contracting.

(U. S. C. C. A. N. Y.) In an action by a contractor for public work, for breach of the contract which rendered the work more expensive, defendant may show that by reason of sub-contracting the work plaintiff sustained no actual damages, but that the loss, if any, fell upon the sub-contractors.—City of New York v. Selden, 255 F. 317.

### Right to Abandon Project After Assessment Rolls Made.

(Ill.) A municipal corporation has the lawful right to abandon an improvement project, though the assessment rolls have been made and spread.—Gray v. City of Joliet, 122 N. E. 550.

### Permission to Competing Lines of Motor Busses.

(Ill.) If, in pursuance of policy of Public Utilities Commission, it would not grant certificates of necessity and convenience to competing lines of motor busses, it would undoubtedly, when two corporations were asking certificate for same purpose, have authority to determine which was capable of serving public best.—Chicago Motor Bus Co. v. Chicago Stage Co., 122 N. E. 477.

In view of fact that motor bus company had been several years in field, and had spent large sums in securing rights to operate on streets of city and in developing its business, as against another company which had just come into existence, and had spent no money, former company should be entitled to preference by Public Utilities Commission in granting certificate of necessity and convenience, unless public interests would be served best by other company.—Id.

Mere priority in time of application would not of itself govern granting of certificate of necessity and convenience between competing motor bus companies, but is element to be considered, in connection with all other elements and facts, in determining reasonableness of action of Public Utilities Commissioners.—Id.

Orders of Public Utilities Commission granting to stage company certificate of necessity and convenience to operate motor bus lines on south side of Chicago, and denying to bus company, which had been operating in city for some time and had expended large sums in developing business, a like certificate, on account of immediately preceding grant to stage company, held unreasonable.—Id.

### Leaky Hydrant—City Liable for Damages.

(Mo.) A city, having installed a defective or leaky hydrant in front of plaintiff's premises, is liable for damages from water escaping therefrom and seeping into the building.—De Mayo v. Kansas City, 210 S. W. 380.

### Brick Pavement—Specifications for Filler.

(Ill.) Although an estimate for brick street paving did not separately itemize the composition of the concrete filler and the cost thereof, it was sufficient where substantially complying with the statute and sufficiently specific to give the property owner a general idea of what it was estimated the substantial component elements of the improvement would cost.—Village of Lovington v. Gregory, 122 N. E. 504.

The objection of variance between ordinance and estimate was untenable, where the ordinance specifically stated composition of the concrete filler and the estimate included the filler in the item of square yards of vitrified brick paving with a Portland cement foundations, with a cement sand cushion, in the words: "A Portland cement grout-filler to fill all interstices between the brick."—Id.

### Power of City to Make Contract—Exercise of Police Power By State.

(Ga.) Under Const. art. 4, § 2, par. 2 (Civ. Code 1910, § 6464), neither the Legislature nor any municipality can by ordinance or contract abridge the exercise of state's police power, but municipality may make contract on such subject, where state has not exercised its police power with reference thereto.—Georgia Ry. & Power Co. v. Railroad Commission of Georgia, 98 S. E. 696.

### Power of City to Declare Nuisance—Unnecessary Injury in Abatement.

(Tex. Civ. App.) A city council has the power to declare what shall be a nuisance.—City of Forney v. Mounger, 210 S. W. 240.

A city council has power to declare what shall be a nuisance, and to abate the same and to impose fines upon parties who may continue or suffer nuisances to exist.—Id.

That the owner of stables permits filth to accumulate therein, so as to constitute a nuisance, does not authorize the municipality to destroy the buildings themselves, such destruction not being necessary to abate the nuisance arising from the filth, in view of Vernon's Sayles' Ann. Civ. St. 1914, arts. 845 and 846, giving the city the power to compel the cleansing of the premises.—Id.

The abatement of a nuisance by a city must be limited by its necessity, and no unnecessary injury to property must be permitted.—Id.

### Duty to Maintain Street Ministerial, Not Governmental—Liability for Injury.

(Mo.) While there is lodged in a city discretion as to time at which and place through which it makes improvements, yet when discretion has been exercised and a street has been made, the duty of maintaining it in repair so that it will not become a menace to the public is not governmental, but ministerial.—Henson v. Kansas City, 210 S. W. 13.

Action will lie for injuries caused by dangerous defects in street which city suffers to remain after reasonable notice of existence thereof, although such defects developed from well-understood physical laws operating upon the conditions produced by the plans which the city adopted.—Id.

Where plan adopted by city is manifestly dangerous and unsafe or leaves the street in an obvious dangerous and unsafe condition, the city is liable for an injury produced as the proximate cause of such patently dangerous plan.—Id.

# NEWS OF THE SOCIETIES

**Aug. 26-28.**—LEAGUE OF CITIES OF THE THIRD CLASS IN PENNSYLVANIA. Twentieth annual convention, Allentown, Pa. Secretary, Fred H. Gates, city clerk, Wilkes-Barre, Pa.

**Aug. 27-29.**—VIRGINIA STATE FIREMEN'S ASSOCIATION. Thirty-third annual meeting, Charlottesville, Va. Secretary, E. K. Landis.

**Sept. 30-Oct. 1-3.**—NEW ENGLAND WATERWORKS ASSOCIATION. Annual meeting, Albany, N. Y. Secretary, Tremont Temple, Boston, Mass.

**Oct. 27-30.**—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, New Orleans, La. Secretary, A. W. Hedrich, 169 Massachusetts ave., Boston, Mass.

**Nov. 12-14.**—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Springfield, Ill.

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### American Public Health Association.

The next annual meeting of the American Public Health Association is to be held at New Orleans, La., Oct. 27-30 inclusive. The central themes of discussion will be Southern health problems, including malaria, typhoid fever, hookworm, soil pollution and the privy, etc.

The general belief among the health profession is that influenza will return next winter, and a full session will therefore be devoted to this subject for the purpose of developing methods of control.

A special effort has been made to arrange the program to meet the practical needs of health officials. Accordingly there will be discussion on such questions as the attitude of legislators toward public health, the obtaining of appropriations, co-operation from women's clubs, health organizations, etc., the organization of health centers, and so on.

The programs of the sections will, as usual, deal with public health administration, vital statistics, sanitary engineering, laboratory methods, industrial hygiene, sociology and food and drugs.

Two special programs will also be presented on various phases of child hygiene and personal hygiene.

Winter railroad rates to New Orleans will be in effect from all points after October 1.

The program of the meetings may be obtained about October 5 upon application to the secretary, 169 Massachusetts Ave., Boston, Mass.

### League of Pennsylvania Third Class Cities.

The annual convention of the League of Cities of the Third Class in Pennsylvania will be held Aug 26-28 at the Hotel Traylor, Allentown, Pa.

At the morning session, Tuesday, Major A. L. Reichenbach, of Allentown, will deliver the address of welcome and city solicitor Charles F. McHugh, of Wilkes-Barre, will respond. Reports will then be submitted by the secretary and the treasurer and by the executive and legislative committees. A special buffet lunch will then be served at the hotel.

The afternoon session will be opened by an address on "Equitable Property Assessments" by Lawson Purdy, president, National Municipal League. John G. Fertig, assistant director of the Legislative Reference Bureau, Harrisburg, will describe "The New Legislation Affecting Third Class Cities." "The Electric Oxidation System of Sewage Disposal" will be explained by Frank M. Merck, chemical engineer. Frank Koster, City Planner, New York, will deliver an address on "The Value of City Planning." The Law Committee will then report.

At 3:30 the members will visit points of interest in the city, including a modern cement mill in operation; the plant of the International Motor Co., making trucks, flushers, highway equipment; city planning exhibit at the hotel; Aldrich Pump Co.'s plant, making water works pumps; the electric oxidation sewage disposal plant at Easton, Pa.; Traylor Engineering Co., cement guns and rock crushers; Bethlehem Motors Corp., trucks for highway construction; Allentown Waterworks and other points of public interest and manufacturing plants.

In the evening there will be an entertainment in the hotel ball room directed by P. W. Blake, secretary of the Chamber of Commerce.

The Wednesday morning session will be opened by Clinton Rogers Woodruff, secretary, National Municipal League, with an address on "Municipal Home Rule In Pennsylvania." Dr. C. A. Emerson, Chief Engineer, state department of health, will speak on "Relation of State Health Department to Third Class Cities." Homer Talbot, secretary of the League of Municipalities of New Jersey, will describe the work of that organization. F. H. Schoonmaker, Bradford, Pa., will deliver an address on "Uniform Ordinances for Third Class Cities." There will be discussion after each paper and there will then be general discussions on the following subjects: Garbage disposal, incineration reduction, hog feeding; compensation insurance; paid fire department; playgrounds; municipal enterprises for revenue; municipal aeroplane landing fields. A business meeting will follow.

Wednesday afternoon there will be a playground exhibition under the direction of Geo. B. Smith, park superintendent, and Richard Schmoyer, playground supervisor; a visit to the Trex-

(*Continued on page* 128)

# PROBLEMS CITIES ARE STUDYING
## WITH EXPERTS

A WATER SUPPLY SYSTEM is to be built by Herkimer, N. Y., to cost $350,000. The consulting engineer is R. E. Horton and the associate engineers are Hazen, Whipple & Fuller.

The city of Taft, Cal., has had estimates prepared for PAVING IMPROVEMENTS, involving macadam paving, cement walks, etc., to cost $234,000. The consulting engineer is E. M. Lynch.

PAVING IMPROVEMENTS are to be made by the city of Red Cloud, Neb., consisting of the paving of forty blocks with sheet asphalt, asphaltic concrete or brick. The consulting engineers are Grant, Fulton & Letton.

SEWERAGE and WATER WORKS IMPROVEMENTS are to be made by the city of Fairfax, Mo., preliminary plans for which have been prepared by the consulting engineers, Archer & Stevens.

Rockwell, Ia., has advertised for bids for the improvement of the SEWAGE TREATMENT PLANT, involving change of inlet arrangement, reconstruction of sludge beds, construction of housed trickling filters and miscellaneous sewer lines connected with plant. The consulting engineers are the Central States Engineering Co.

Adair, Ia., has advertised for bids for STREET PAVING. Plans were prepared by the consulting engineer, Theo. S. DeLay.

A WATER WORKS SYSTEM is to be built by the city of Red Bluff, Cal., plans for which are being prepared by the consulting engineering firm of Olmsted & Gillelen.

SEWERAGE IMPROVEMENTS are to be made by the city of Aberdeen, S. D., for which $325,000 bonds were voted. The consulting engineers are Burns & McDonnell.

ROAD IMPROVEMENTS, involving the construction of fifty-two miles of lime stone macadam and two miles of bituminous macadam, are to be made by Washington Co., through the towns of Fayetteville, Winslow and Goshen, Ark. The consulting engineers are Hamilton & Shreve.

Hartford Co., Hartford, Conn., plans to build a BRIDGE spanning Connecticut river from Warehouse Point (Hartford) to Windsor Locks. The county commissioners have retained the consulting engineer, G. H. Sage, of Berlin Bridge Co., to work in conjunction with C. J. Bennett, state highway commissioner, to prepare the plans. The estimated cost is $350,000.

# INDUSTRIAL NEWS

### The Asphalt Association.

Captain Bruce Aldrich who will take charge of the Toronto office of the Asphalt Association as district engineer of the Canadian District, with headquarters at the office of the H. K. McCann Company, Limited, Toronto, Ont., is a native of London, England. He came to Canada at an early age and began his education in the public schools of Ottawa, returning later to England to complete his studies. From England he came to the United States and after serving as a volunteer in the United States Army in the Spanish-American and Philippine wars, he was appointed in 1901 to a position in the office of inspector of asphalts and cements, Engineer Department, District of Columbia, where he served in various capacities testing paving materials under Professor A. W. Dow, of New York, until February, 1912.

In March, 1912, he went to Baltimore, Md., which city was then beginning operations on the biggest paving program it had ever undertaken, with expenditures aggregating nearly $15,000,000.00. Capt. Aldrich organized and equipped the Municipal Laboratory in which were tested all the materials entering into the new paving. As inspector of asphalts, he supervised the laying of more than 3,000,000 square yards of sheet asphalt and bituminous concrete, having on occasions as many as seven asphalt plants working at the same time. He assisted also in the inspection of the laying of all vitrified brick and granite block paving laid by the city.

At the outbreak of hostilities between the United States and Germany, Mr. Aldrich served in France as a captain of infantry for one year, returning to the United States and resuming his former duties in Baltimore June 5, 1919. He resigns this office to become connected with the Asphalt Association, 15 Maiden Lane, New York.

Captain Aldrich will devote his attention to cooperation with officials and engineers in the several provinces with a view to bringing about the most constructive results possible in asphaltic highway work.

### Business Reconstruction Information.

Realizing that American business must, with the signing of peace, be furnished with information concerning foreign reconstruction and readjustment activities, the United States Council of National Defense has prepared for distribution the latest data available. Through its Reconstruction Research Division the Council is now transmitting this material in the form of a printed volume of 188 pages to all member organizations of the United States Chamber of Commerce and to all public libraries. The volume is completely indexed and covers as fully as possible in tabloid form information gathered by the Council.

A few of the headings, taken at random, include: The medical, surgical and hospital treatment of disabled soldiers throughout the world; the development of all merchant marines; conditions in New South Wales, New Zealand and the United Kingdom; the irrigation and reclamation of lands, leather and textile industries, the timber resources of South Africa, trademarks, unemployment, insurance and Government allowances; the activities of the Belgian reconstruction committee in Paris; express train service from Paris to Constantinople; the construction of public works throughout the world; Government ownership of railroads; the situation in Denmark, and the collective buying of materials in France.

The volume contains information conecrning readjustment and reconstruction activities in forty-six foreign countries and groups of countries, relating mainly to the governmental activities in the organization and administration of readjustment and reconstruction work. Compiled from such important official periodical publications of the various governments as were available, and from private sources where official information could not be obtained, it covers several hundred different subjects of readjustment and reconstruction activity.

Among these may be mentioned the steps taken in the various countries for the restoration of forests and the revival and increase in agricultural and forestry production; the various treatments that have been accorded discharged soldiers and sailors in the way of bonuses, employment and reeducation; the facilities given for their settlement in homes and on farms; investigations made in the various countries where destruction had been wrought, concerning economic conditions; the disposition and utilization of war materials, and steps taken for the changing of factories producing war material to a status of peace production. The systems of finance, banking and credit adopted in the various countries are outlined and the steps taken for the relief of food scarcity and the rehabilitation of the invaded areas are pointed out. The need for and methods used in controlling the distribution of raw materials are outlined, and the plans for the restoration of foreign trade relations and of transportation systems are discussed.

The Director of the Council, Grosvenor B. Clarkson, stated that because of the practical impossibility of supplying all the business interests throughout the country with separate copies of this digest, it has been considered best to furnish the public libraries of the country with two copies each, and in addition to deliver a copy to each of the member organizations of the United States Chamber of Commerce, as well as to all trade journals—this because of restrictions in the edition due to the necessity of conserving the limited funds available to the Council under its present appropriation.

# NEWS OF THE SOCIETIES

(*Continued from page 127*)

ler Game Preserve and an outing, with pig roast and clam bake.

Thursday morning, Major R. Keith Compton, consulting enginner, Baltimore, Md., will deliver an address on "Practical Points on Bituminous Construction." Following this there will be discussion, unfinished business, election of officers, etc.

### International Association of Municipal Electricians.

Arrangements are rapidly being finished for the 24th annual convention of the International Association of Municipal Electricians which will be held at the Auditorium Hotel, Chicago, Sept. 23-26, inclusive. The technical program cannot yet be announced, but it will include reports, papers and addresses on timely topics of interest. An exhibit by manufacturers of electrical apparatus and supplies used by municipal electrical departments will be a feature supplementing the program. An entertainment program is being worked out that will provide relaxation between the sessions and entertainments for the ladies during the technical sessions. Clarence R. George, Houston, Texas, is secretary of the association, and William S. Boyd, 175 West Jackson boulevard, Chicago, is secretary of the local committee on arrangements.

# PERSONALS

Mohler, John D., assistant city engineer, St. Joseph, Mo., has resigned to accept the position of special highway engineer, in charge of road construction, Buchanan county, with headquarters at St. Joseph, Mo. The county recently voted $2,000,000 in bonds for hard-surfaced roads.

Charles C. Hopkins and Arthur M. Field have become associated under the firm name of Hopkins & Field, consulting engineers, Cutler Building Rochester, N. Y. Mr. Hopkins has been in practice as a consulting engineer in Rochester. Mr. Field has been city manager of Winchester, Va.

Raynor, Capt. Ernest G., 141st Engineers, U. S. A., has been discharged and has been appointed assistant division engineer, State Engineering Department, Nebraska, with headquarters at Lincoln.

Morrow, Capt. Ben S., has returned from overseas, where he was in charge of developing the water system at Brest. He will resume his former connection with the water bureau, Portland, Ore., taking charge of the development at Bull Run Lake.

Hoff, C. E., has been appointed county engineer, Bexar County, Texas.

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City County State

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*City officials and civic organizations are particularly requested to send to Municipal Journal and Public Works regularly their annual and special reports.*

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*The Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.*

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## TIMELY CENSUS REPORTS.

A few years ago we called attention to the inexcusable delay of the Census Bureau in publishing its reports, especially as such delay was not utilized in detecting and correcting easily discoverable errors. The census officials pleaded insuperable obstacles as the reason for this; but shortly after that, radical changes were made in the bureau, and during the past two or three years its reports have been issued much more promptly.

The latest illustration is the report on "Municipal Markets," giving thirty-one pages of statistics concerning such markets in the 224 cities of more than 30,000 population, these being for the year 1918, and accompanied by eighteen pages of comment on and summarizing of such statistics the preparation of which must require some time. Compared with the two to four years that formerly used to elapse before the publication of data collected, this report, recently distributed, is commendably prompt and the information furnished is most timely. We expect to present an abstract of some of it in a week or two.

## HOW LONG SHOULD CONCRETE BASE SET?

In the case of a very busy street, such as that referred to in the leading article in this issue, it is undoubtedly desirable to interfere with the traffic as little as possible, reducing to a minimum the time that each section of the street is kept closed by the paving operations. It is largely, if not wholly, with this aim that New York uses bituminous rather than cement filler for stone block, traffic using new pavement five minutes after the filler has been applied, while cement filler should stand as many days before use.

But it is a question in our mind whether the hastening of restoration of this pavement to traffic use was not overdone in the Seventh avenue work. Heavy trucks passed over this pavement 28 to 36 hours after the cement base was laid. In base laid only an hour later than that over which traffic was passing, the writer was able to dig a hole an inch deep with his finger nail and pry out a stone with a pencil point without breaking it. The effect on such concrete of heavy traffic rolling continuously over it for twelve to eighteen hours a day while it is trying to set must be, it seems to us, far from advantageous. The very fact that the traffic is unusually heavy on this pavement, while it urges haste in restoring it, also calls for an unusually strong and durable base.

An additional cause for apprehension is found in certain other details of the construction. The concrete set all the more slowly because of its consistency, and the large amount of water used must alone reduce the strength to not more than half of what it might have been. Pedestrians disregarding warnings and crossing this concrete half an hour or after it was laid were seen to sink into it almost to the subgrade. Also the concrete was retained in the mixer only about thirty seconds, which was unnecessary since the batches averaged two minutes apart and the mixer ran empty a full minute for each batch. Owing to the rain Monday and Tuesday of last week, concrete base over a short stretch of street stood for four days before the blocks were laid and traffic turned onto it. It will be interesting to note whether the condition of this section of pavement will differ from that of the other a few months or years from now.

It may or may not have any bearing upon the effect which the presumably weak base will have upon the wear of the pavement that the filling of the joints left much to be desired. But at least it will, we believe, detract from the future smoothness of the pavement that in probably ten per cent of the joints the asphalt-sand filler settled to a depth of from a half-inch to two inches below the tops of the blocks, which deficiency was not made up by a second pouring but by the sand and dirt that was immediately spread over the pavement as soon as the filler had been squeegeed into the joints.

The contractor is certainly to be congratulated on his success in causing a minimum of interference with traffic and in completing the job in two-thirds the time allowed. But we cannot but feel, considering the enormous amount of traffic that this street carries and that a most durable and expensive material was therefore employed for paving it, that the manner of laying this material was not what it should have been, and that the users of this roadway and the taxpayers will pay too dearly for the abbreviation of inconvenience that presumably was the excuse for the methods referred to above.

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# QUICK WORK IN LAYING GRANITE BLOCK PAVEMENT

### A Half-Mile of Seventh Avenue, New York, Paved in Forty Working Days—Street Crossings Closed to Traffic Only Three Days—Composition of Working Gangs and Methods Employed.

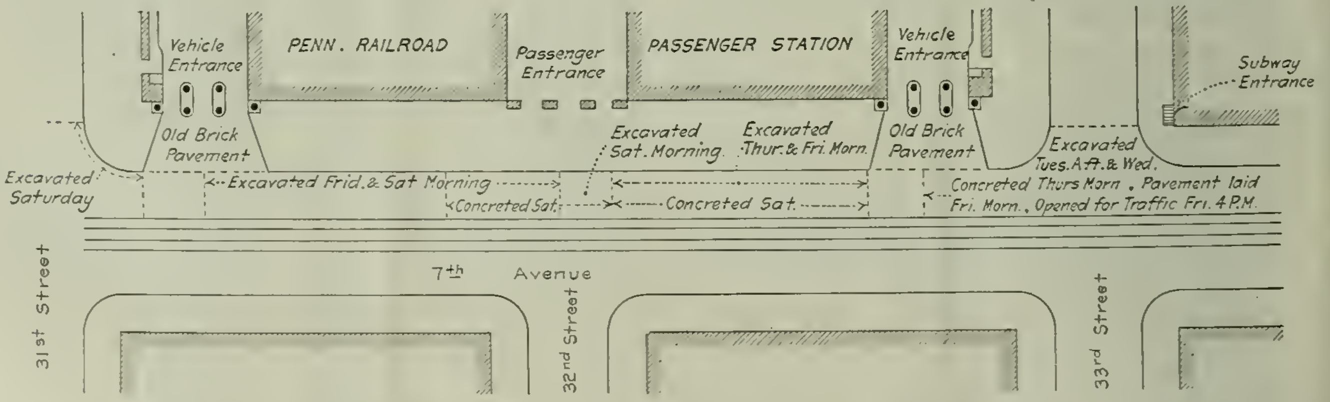
By CLARENCE D. POLLOCK.*

Seventh avenue, New York City, from 30th Street to 42nd Street, has just been repaved with a modern granite block pavement upon a portland cement concrete foundation. This portion of Seventh avenue was formerly paved with sheet asphalt, but it was removed during the construction of the subway, three or four years ago, as the work was done by the "cut and cover" method, and all traffic carried on the heavy plank roof of the excavation. After the opening of the new Pennsylvania station, with its entrance on the west side of Seventh avenue between 31st and 33rd streets, there was a big increase in the traffic and it was necessary to replace the former pavement, after the completion of the subway, with a pavement which would afford a smooth surface, and yet be capable of sustaining very heavy traffic, and consequently a granite block pavement was selected.

Seventh avenue has a width of one hundred feet between property lines and a roadway width of sixty feet, in which there are two surface car tracks. The car tracks and the space between the tracks are paved with asphalt on concrete, but the sides of the street, since the completion of the subway, have been paved temporarily with second-hand stone blocks laid upon the earth as a foundation until the fill over the subway should have had sufficient time and opportunity to settle. The space between the curb and the rails is twenty-two and one-half feet in width on each side of the avenue, except that it is thirty feet in width on the west side in front of the Pennsylvania station between 31st and 33rd Streets.

A contract was let to W. J. Fitzgerald of New York City to repave Seventh avenue from 30th Street to 42nd Street from and including the curbs to the rails with granite block pavement on 6-inch concrete foundation, using Manhattan specification granite blocks with an asphalt-and-sand filler and a portland cement mortar cushion.

Work was begun upon this contract on June 26, 1919, and has been pushed with great speed and a minimum amount of interference with traffic. The speed on this



SEVENTH AVENUE BETWEEN 31st AND 33rd STREETS, SHOWING RATE OF PAVEMENT CONSTRUCTION.

The above sketch shows the 7th Avenue front of the Pennsylvania Railroad passenger station, and the method of repaving with as little interference with traffic as possible. This was done by tearing up the pavement in front of only half of the width of each vehicle entrance, and completing the repaving of this before tearing up the other half; by leaving a strip of the old pavement in front of the passenger entrance, for the use of pedestrians crossing the street or using the street cars, until just before it was concreted, and laying planks on the concrete at this point as soon as it was laid, for the same use; and by rushing the work as much as possible.

The photographs shown in this article were taken from the point A in the plan, and show the 7th Avenue and 33rd street corner of the passenger station. The removal of the old pavement here and up to the center of 34th Street began Tuesday afternoon, and the grading was completed Wednesday. Concreting at this corner began at 8 a. m. Thursday; paving began at 8 a. m. Friday, and traffic was using the new pavement at 4 p. m. Friday, or 28 to 32 hours after the concrete base was laid. Owing to a rain storm Monday and Tuesday, pavement was not laid south of this point (toward 31st Street) until Wednesday.

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*Of Pollock & Taber, consulting engineers, of New York City.

work is due to the contractor having a good organization and giving close personal attention to the work.

The first work was the distributing of the new granite curb-stone along each side of the street, after which the old paving blocks immediately adjacent to the old curb were removed and the new granite curb, 6-inches in width by 16-inches in depth, was set in concrete.

Next the granite paving blocks, which came from quarries of Joseph Leopold & Co., at Vinal Haven, Maine, were delivered and piled along the sidewalk. The next step was the loosening of the old paving blocks and the loading and carting of them away. In loosening, one row of blocks out of every 8 or 9 was removed by bars and the others pried loose; traffic continuing to use the pavement more or less until all the blocks were actually removed. Motor trucks were used for hauling away the old blocks and the dirt removed in grading.

The men who loaded the blocks onto the trucks were then placed on the grade and removed the earth to subgrade and shaped the subgrade to a surface parallel to the finished pavement. Usually there were from thirty to thirty-five men on this portion of the work.

The next step was the mixing and placing of the concrete, which consisted of one part of portland cement to three parts of sand and six parts of gravel. The concrete mixer was a Koehring batch mixer with a delivery trough or spout. The gang on the mixer usually consisted of three men handling cement, twelve shoveling and wheeling gravel to the mixer and five on the sand. One man operated the trough and three men spread the concrete delivered by the spout and one engineer ran the mixer.

The photographs on this page were all taken from the point "A" in the plan on page 128. In each case the photographer waited for a break in the traffic, which is normally heavier than shown.

The first photograph shows condiions at 1 P. M., August 12th, just before the old blocks were removed. The second was taken at 11 P. M., August 13th, and shows old blocks being loaded into a truck and the grading gang at work. The third photograph was taken at 10 A. M., August 14, and shows concreting in progress. The raised umbrella shows that work was not stopped for a light rain. The laying of the blocks on the 15th is shown in the photograph on the next page.

After the concrete had had a chance to set for forty-eight hours or more a cushion consisting of one part of portland cement to three parts of sand was mixed without the addition of water and was then slightly moistened and spread to a depth not to exceed one inch over the concrete, after which the pavers laid the blocks, standing in the grade the same as when a sand cushion is used. The paving gang usually consisted of fourteen or fifteen pavers and seven rammer men besides the men on the dry mortar cushion and the stone chuckers putting the blocks in the grade.

After the blocks had been paved, rammed and backrammed, hot asphalt was drawn from large heating kettles or tanks on the street, by means of a hand pump, into a mechanical mastic mixer, consisting of a small machine having an inverted conical shaped tank with paddles set at an angle on a shaft revolving inside the tank. This shaft is operated by gears at the bottom which in turn are connected with a ten-horse-power gasoline engine. This machine and engine were placed near the large tank in which the asphalt was heated and the hot asphalt cement was transferred by means of a hand pump from the large tank to the tank on the machine. After this, fine, hot sand was added and the paddles on the shaft agitated the mixture thoroughly until it was homogeneous, after which this hot mastic was drawn off, from one opening in the bottom of the tank or hopper, into wheelbarrows and dumped upon the rammed granite blocks, and pushed into the joints by means of hoes or steel squeegees. After the joints had been filled, sand was spread over the surface to prevent traffic from sticking. Six to ten men were used in this work.

The common way has been to draw the hot asphalt cement into wheelbarrows and then add the hot sand and stir it with hoes or shovels and then dump the hand-stirred mastic upon the pavement. The mechanical method gives a more uniform product.

The specifications required that the granite paving blocks be not less than 6 inches nor more than 10 inches long; not less than 3½ inches nor more than 4½ inches wide; and not less than 4¾ inches nor more than 5¼ inches deep. The contractor was required to select a definite width of blocks to be used on each city block in the contract and then to live up to this selection with an allowable variation of ¼ inch either way from this width, but with the limits for width of blocks specified.

The blocks must be approximately rectangular on top and sides and uniform in width and so cut that the joints between individual blocks, when laid, shall average not more than ⅜ inch. The head of the block shall have no depression greater than ¼ inch from a straight edge laid in any direction and parallel to the general surface of the block.

The blocks are required to be inspected first at the quarry or at the dock and if the percentage of blocks failing to conform to the specifications found in 1,000 blocks, as unloaded, exceeds 15 per cent., the whole cargo is to be condemned and not used on the work. This acceptance does not stop the rejection of individual blocks on the street.

The bituminous material in the joint filler is asphalt cement obtained by the distillation of an asphaltic petroleum at a temperature not exceeding 700 degrees F., with a melting point of not less than 115 degrees F. nor more than 130 degrees F.; solubility in carbon tetrachloride not less than 98½ per cent; penetration at 77 degrees F. not less than 60 nor more than 100.

The work has been carried on rapidly, especially in paving the intersections. The traffice on all the cross-town streets is heavy and it was very desirable not to block them longer than was absolutely necessary. The old blocks were removed, the roadway graded and the concrete was placed often in one day and the pavement was laid the second day afterward, requiring a total period of three days for the entire operation. As shown by the figures above, the complete gang consisted of 80 to 100 men, who completed about 600 square yards of pavement a day.

Some of the principal items in this contract are 5,200 linear feet of 6-inch granite curb, 3,200 cubic yards of concrete foundation, and 17,500 square yards of granite block pavement. The time allowed in the contract for the completion of this work is seventy working days and it will be finished well within this time, probably by August 23rd, or within about forty working days.* The cost of the work, based on the unit price bid, was $129,800.

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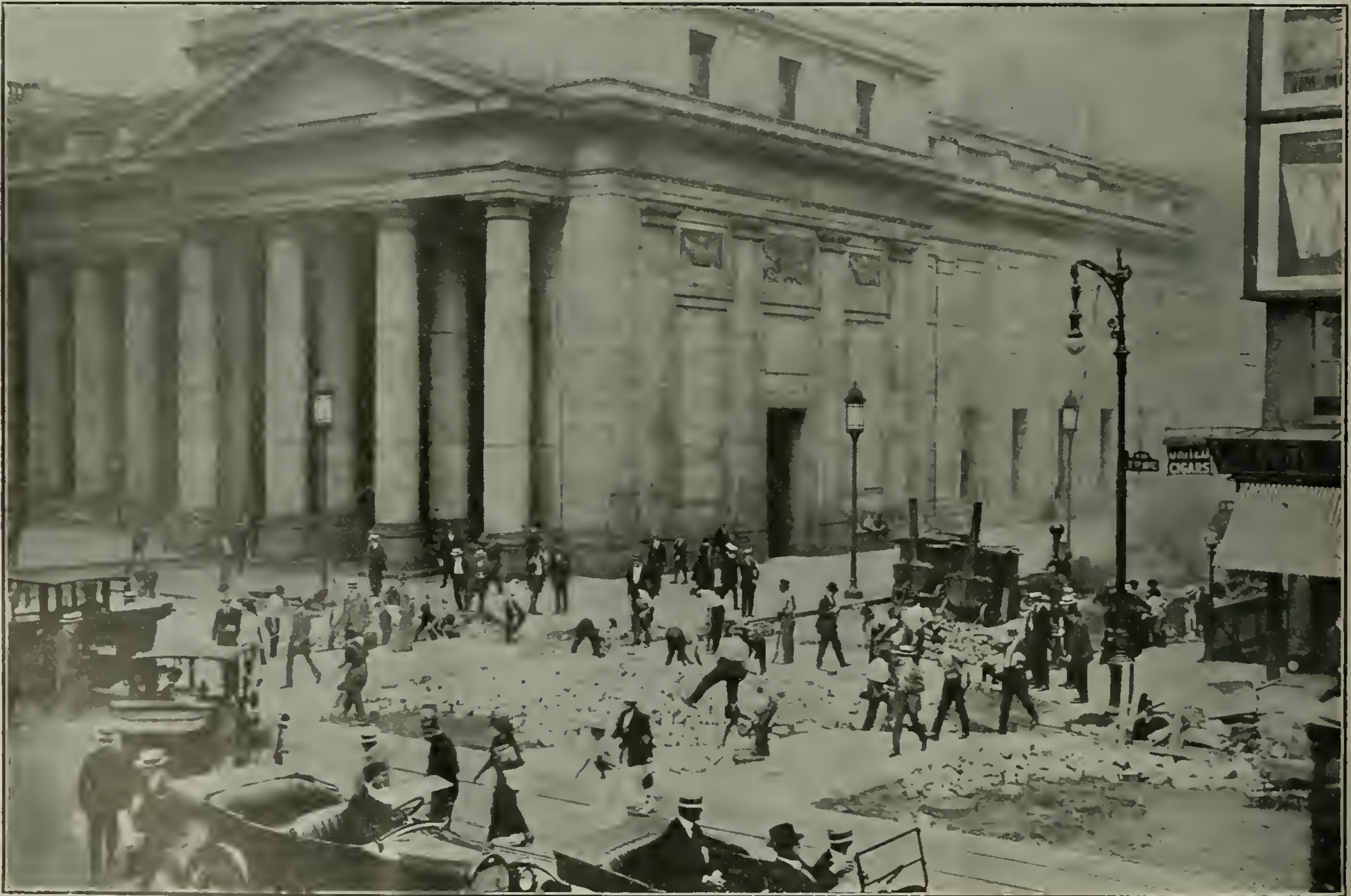
*This article was written on August 18th. Work was stopped by rain during that day and the one following, and the contract was completed on August 26th.

## AKRON'S NEW WATER TANK.

The Bureau of Water Works Improvement of Akron, Ohio, finding it necessary to place a standpipe or tank in a residence district of the better class, desired to provide a structure that would be less objectionable in appearance than the usual steel tank. With this idea it asked for bids for a 150,000-gallon tank of three alternative designs: (A) A monolithic reinforced concrete tower and tank, with pump room incorporated in the basement. (B) A standard elevated steel water tank. (C) An ele-



LAYING BLOCKS AND FILLING JOINTS

Taken at 9.45 a. m., August 15th, 24 hours after the concrete was laid. The strips of old pavement left in front of the vehicle entrance to the station can be seen at the extreme left. Two heating tanks (appearing beyond the pavers) are heating asphalt vated steel water tank enclosed in a concrete tower, with pump room incorporated in the basement.

When bids were opened on August 1, the only one received were for a standard vertical-leg steel tank, design (B); and as the season was so far advanced it was not thought advisable to advertise again. It is unfortunate that this desire of the bureau to provide an ornamental structure has been frustrated. It is possible, however, that at some future time the steel tank will be enclosed in a masonry shell, we are informed by G. Gale Dixon, the chief engineer of the bureau.

## BIRMINGHAM PAVING NOTES.

Birmingham, England, has about 27 miles of wood block pavement, part of Australian Jarrah and prismatic oak, but mostly of creosoted deal. The Jarrah blocks, when worn, were taken up, boiled to remove the pitch filler that adhered to them, and the heads recut on a special circular saw bench, reducing their depth to 3 inches. This practice was found to be economical and will be continued while the price of lumber is high.

In general, the granite blocks used are 4 by 4 by 5 inches, laid in courses at 45 degrees with the curb and the joints filled with cement grout. Several pieces of Durax pavement have been laid, to serve medium heavy traffic at less cost than ordinary granite or wood. In some cases the Durax has been laid on an old macadam pavement, the surface of which has been trued off and covered with ¾ of an inch of tarred stone chips which would pass a ⅜-inch mesh. The stones are rammed into this bituminous binder and grouted with pitch. Where Durax is laid on a concrete base, a sand cushion and cement grout filler are used.

## ELECTROLYTIC SEWAGE TREATMENT

### Investigation by Committee of Franklin Institute of Plant at Easton, Pa.—Figures Obtained During Test Run and Conclusions of Committee.

In February of this year, the Committee of Science and the Arts of the Franklin Institute conducted an investigation of the sewage treatment plant in Easton, Pa., using the electrolytic process and called the "direct oxidation" process. This plant was described in Municipal Journal for November 16, 1918. The investigation was carried on under the direction and supervision of H. J. M. Creighton, of the Department of Chemistry of Swarthmore College, and Benjamin Franklin, M. Am. Soc. C. E., of Franklin & Co., consulting engineers of Philadelphia; assisted by Prof. James De Long, of Lafayette College, who made the chemical determinations, and Dr. E. Q. St. John, of Philadelphia, who made the bacterial determinations. As a result of this investigation, the Franklin Institute decided to award to the inventor, C. P. Landreth, the Howard N. Potts gold medal, which medal is awarded for "distinguished work in science or the arts; important development of previous basic discoveries; inventions or products of superior excellence or utilizing important principles; and for papers of especial merit that have been presented to the Institute and published in its 'Journal.'"

Summarizing the results (which are given in detail in the report of the committee, and in somewhat abbreviated form in the following abstract), it was found that by this treatment "there is a marked decrease in free ammonia and albuminoid ammonia," and "an increase in dissolved oxygen of about 40 per cent;" "while practically all of the dissolved oxygen in the raw sewage is absorbed during the five-day period, that in the effluent produced by the electrolytic treatment is reduced only 0.77 part per million, or 12.6 per cent, a figure which lies far below the limit allowed by the Royal Sewage Commission." The treatment "brings about a reduction of over 92 per cent in the total bacteria count" and 99.85 per cent in B. Coli. After having been kept in stoppered bottles for five weeks, the effluents "had little or no odor." The effluents referred to were those from the electrolytic tank and were considered to be "highly satisfactory," and "by the conjunctive use of a sedimentation basin the suspended solids, consisting largely of lime, could be considerably reduced. This reduction would also be attended by a further decrease in albuminoid ammonia, required oxygen and the bacteria." "A plant of this type can be installed and operated in any densely populated section without detection by the public."

The investigation was made on February 18, 19, 20 and 21. Composite samples of both the raw sewage and the effluent were prepared from half-hour samples of these liquids, and the chlorine, nitrite, nitrate, required oxygen and dissolved oxygen were determined in the former samples immediately after obtaining them. Determinations of albuminoid and free ammonia were made at once at the laboratories of Lafayette College, about a half-mile away. Samples for bacteria counts were taken from raw sewage and effluent at intervals of 2½ hours or less, kept on ice, and sent to Philadelphia daily by special messenger. One litre of each composite sample of raw sewage and of effluent was placed in bottles of that volume, with only a small air space at the top to allow for expansion, and sent to the chemical laboratories of Swarthmore College, where determinations were made of the dissolved oxygen remaining in the samples at the end of five days and of the suspended matter.

As the composition of the raw sewage varied greatly from moment to moment, it was necessary, to ascertain the effect of the treatment, to determine the time required for the sewage to pass from the point where the samples of raw sewage were collected, to that where the samples of effluent were taken. This was accomplished by applying a suitable dye at the first point and noting when it appeared at the second point. This time was found to be 95 seconds from the spillway of the weir and 3 minutes from the entrance to the grit chamber. These times were allowed to elapse between the taking of samples of raw sewage and of effluent. Each sample was taken by dipping up three portions of 250 c. c. each, thirty seconds elapsing between dips.

As it had been suggested that the efficiency of the process was due primarily to the action of the lime which was thoroughly mixed with the sewage in the electrolytic apparatus, electricity playing but a minor part, the examination at Easton included an investigation of the efficacy of the apparatus in the purification of sewage, (1) when the raw sewage, after having been mixed with the usual quantity of lime suspension, was passed through the tank and subjected to thorough mixing by the paddles, without electricity; and (2) when the raw sewage to which no lime had been added was subjected to the action of the electric current in the tank. As the inventor was of the opinion that the electrode would be damaged by allowing the lime-containing sewage to flow through it in the absence of the electric current, or by operating it with electricity in the absence of lime, for periods longer than one hour, the tests just mentioned each extended over a period of sixty minutes. During these two periods composite samples were prepared by taking portions of both the raw sewage and the effluent at intervals of five minutes, while for bacteriological examination samples were taken every ten minutes during the hour.

The hydrated lime, containing 71.36 per cent of CaO, was fed into the mixing vat at the rate of 856.4 pounds per 24 hours, and the milk of lime formed in the vats was added to the raw sewage at the spillway of the weir at the rate of 30 gallons per minute.

The test by the electrolytic lime process was continued for 14½ hours on February 18th, from 6.30 a. m. to 9 p. m.; 13 hours on the 19th, from 6 a. m. to 4 p. m. and from 6 to 9 p. m.; and 8 hours on the 20th. The runs without lime and without electricity were made on the 21st, between 10 a. m. and 1 p. m.

During the tests with the plant running as designed, the sewage flow varied from a rate of 543,000 gallons per 24 hours to one of 358,000 gallons, averaging 464,000. The power consumed was 213 kw. hr. for the 686,000 gallons treated, an average of 0.335 kw. hr. per 1,000 gallons of sewage.

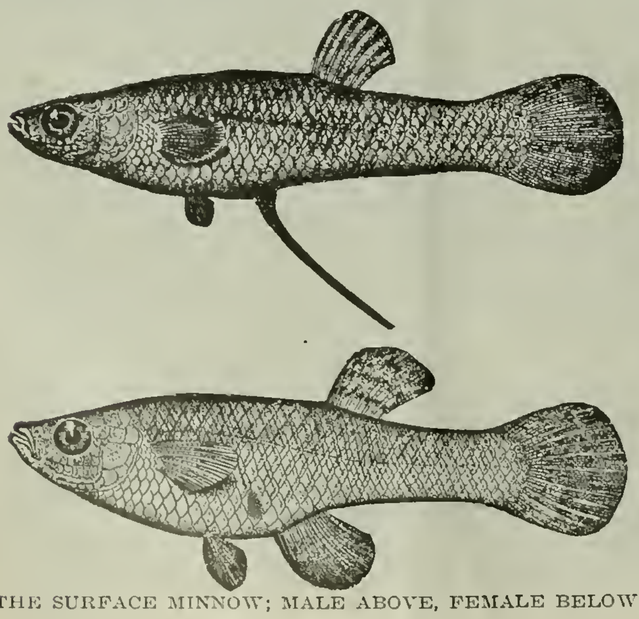
*(To be concluded)*

## FISHES FOR EXTERMINATING MOSQUITOES

### Investigations by the Bureau of Fisheries and the Public Health Service of the Surface Minnow for Destroying Mosquito Larvae.

Most efforts at eliminating mosquitoes are directed toward the destruction of the aquatic stages of the insect, or removing bodies of water where they may develop. The former is attempted by covering the pools of water with a film of oil, which prevents the mosquito larvae from obtaining air, or by introducing into the water some form of animal life which will destroy the larvae.

An investigation of the effectiveness of fishes in destroying mosquito larvae has been made by the U. S. Bureau of Fisheries, which detailed Samuel F. Hildebrand to co-operate with the Public Health Service in such investigation. The experiments were made near Augusta, Georgia, where there were a number of ponds that were undrainable. Little attempt was made to compare the effectiveness of different species of fishes, but the investigation was almost wholly devoted to the determination of the practical value of the top minnow (*Gambusia affinis*), Mr. Hildebrand, as ichthyologist to the bureau, believing that this fish was probably the one most suitable for antimalarial work.


THE SURFACE MINNOW; MALE ABOVE, FEMALE BELOW.

The top minnow was selected because it seeks its food at the surface, lives and thrives under a large variety of conditions, and especially in water suitable for the support of mosquito larvae, it is very prolific, and its effectiveness in destroying mosquito larvae in aquaria and fountains was already well known. In addition, it was quite common in the vicinity of Augusta.

The fish does not lay eggs but gives birth to well developed and very active young. It therefore requires no special environment for depositing and hatching eggs. It breeds throughout the summer, new broods being produced at intervals of about a month or six weeks; six broods of 50 to 100 each in a season having been noted. The young have been seen attacking and eating mosquito larvae before they were a day old. Fish born in April and May have been known to produce young in September.

The chief enemies of the fish in the ponds around Augusta were bass and fishermen, the latter catching great numbers in nets for use as bait in catching larger fish. Apparently the chief protection from larger predacious fishes is shallow water, into which such larger fish cannot follow the minnows. It has also been learned that the female minnow, if other food is not abundant, often eats her own young, nearly as rapidly as they are born.

One pond that was alive with mosquito larvae and pupae was stocked with minnows, which all died in less than 45 minutes. It was found that the pond received waste water from a sulphuric acid works and the water gave a strong acid reaction to litmus paper; thus showing that the fish could not be used in all waters where mosquitoes can breed. Another pond near by and similar in appearance was entirely free of mosquito larvae but well supplied with top minnows, the latter fact undoubtedly accounting for the former.

Where the vegetation in the shallow water is dense, the minnows can not destroy the mosquito larvae, and such vegetation should be kept from developing. In one case where the vegetation was cut and the shores raked, a large school of minnows followed the workmen, consuming the larvae as quickly as their hiding places were destroyed.

In general it was found that "wherever mosquitoes were breeding prolifically *Gambusia* was not present, but, if introduced, mosquito breeding was eliminated or at least greatly reduced. Wherever the complete elimination of mosquito larvae did not result, if sufficient top minnows were present the immature mosquitoes were so protected by vegetation or debris that they could not be detected or reached by the fish."

Protection for mosquito larvae and pupae was furnished by aquatic grass, "coon-tail moss" and algae, but does not appear to be furnished by water lilies, while alive, by duckweed, smart weed, by grasses and rushes and other plants having straight stalks and no slightly submerged leaves, nor by plants growing on the bottom unless the surface of the pond falls so as to bring such plant to the surface.

Mr. Hildebrand observed one adult female minnow eat 165 large larvae in less than 12 hours, and a pair of half-grown ones ate 5,041 in 78 days. In order to clear a pond of larvae, it is desirable to provide more fish where there is protection for the larvae than where there is not. "There appears to be no danger of overstocking, as observations indicate that the more fish a pond supports the more certain are the practical results."

Other minnows, such as the star-headed and roach, were found to destroy mosquito larvae; but none of the various sunfish seemed to be of any value.

The conclusions of the investigation were stated by Mr. Hildebrand as follows:

1. *Gambusia affinis* is especially suitable for antimosquito work because: (*a*) It seeks its food at the surface; (*b*) it is very prolific; (*c*) it gives birth to well-developed young, therefore requiring no special environment for depositing and hatching the eggs; (*d*) It lives and thrives under a large variety of conditions and frequents areas especially suitable for the support of mosquito larvæ; (*e*) it usually lives and multiplies in ponds stocked with predacious fishes, providing it has very shallow water for refuge.

2. Plants which have slightly submerged leaves and stems or which form floating masses are the chief sources of protection for mosquito larvæ against the top minnow. Such plants should be removed from the water or treated in such a way as to make them uninhabitable for the immature mosquito.

3. Mosquitoes may breed in water so badly polluted that *Gambusia* is almost instantly killed thereby.

4. *Gambusia affinis* is of great value in antimosquito work. It eliminates the wriggler completely from ponds which are fairly free of protective vegetation and débris. If much protection is furnished by vegetation and débris, the immature mosquito is not entirely eliminated, but the number reaching the adult stage is greatly reduced.

5. The number of top minnows necessary in a body of water in order to secure mosquito control depends largely upon the conditions which prevail with respect to places of protection, i. e., a much smaller number of *Gambusia* is necessary, if the water is fairly free of hiding places for mosquito larvæ against fish, than if the reverse is true.

## CITY PLANNING FOR PORTLAND*

### Planning Major and Minor Streets—Arguments for Narrower Roadways in Minor Streets—Longer Blocks Recommended

STREET PLANNING.

The problem considered by the commission to be the most important after zoning is the determination of a major street plan. It considers, however, that a final scheme of major streets cannot be settled upon until a comprehensive zone ordinance has been definitely determined upon, establishing the business and industrial districts which are to be served by the traffic streets. The commission has prepared diagrams showing approximately the existing traffic streets, the existing radial and circumferential traffic arteries, and the portions of the existing traffic arteries, both radial and circumferential, that are now paved with heavy-traffic pavement.

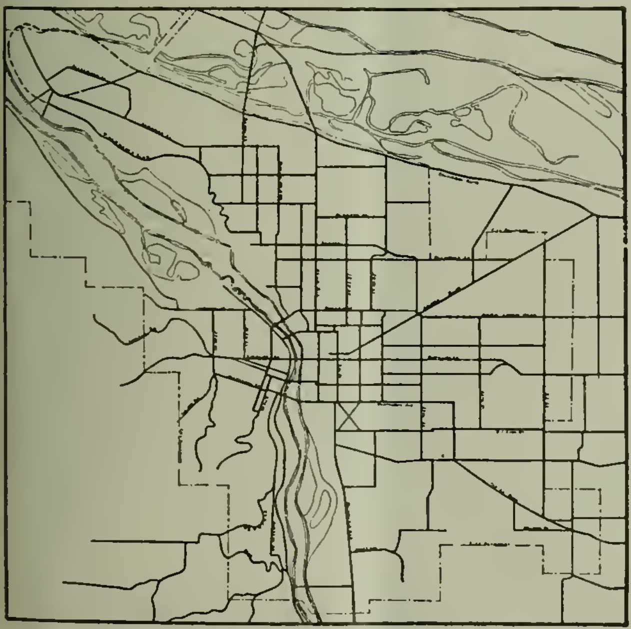
It is considered important not only to settle upon the main traffic streets, but of the greatest importance to the solution of the housing problem to settle upon the minor residence streets for the protection of children and maintenance of quiet, restful, homelike neighborhoods, free from dust, noise and inconvenience of through traffic.

ROADWAY WIDTHS.

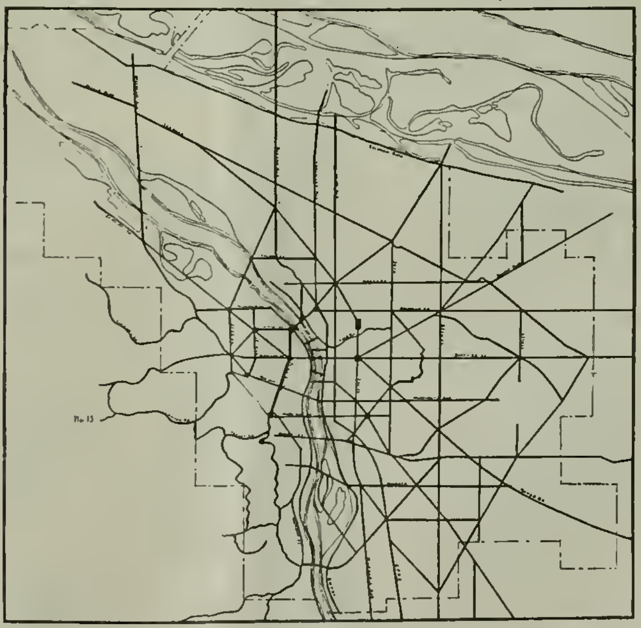
Considerable attention is given by the commission to the width of both major and minor streets. Concerning the former the commission says:

"Whereas city engineers used to think that every street should be laid out as a through street, it is now found that we can only afford to provide the wider and heavier pavement on about every fifth or sixth street, called a main thoroughfare or major street. Although many American cities have begun to recognize the necessity for settling definitely which are the major streets of the city, a complete major street plan has as yet been worked out in only a few cases.

"As soon as hard-surface pavement is now laid on a street of any length, it immediately attracts all the travel from the surrounding neighborhood, becomes more dangerous for children, dusty, dirty and noisy for the houses fronting on it, and therefore less desirable in many ways as a residence street, except for the larger type of dwelling which can afford to set well back from the roadway. In Berkeley and a number of cities recently investigated, it has been established that families with children particularly, seeking either to rent or buy a home, will pay more, or at least give preference in nearly every case to a quiet, out-of-the-way street, free from the speeder and through traffic.



This preliminary study of major traffic streets now used as such illustrates the necessity for diagonal routes and through hauling streets in many parts of the city. Opening and widening of these routes should be done as soon as definite business, residence and industrial zones have been settled upon.



An ideal plan for the development of major traffic streets prepared by E. H. Bennett in 1911, which is now being studied in connection with recent growth of Portland.

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*Concluded from page 118.

"Again, the wider, heavier pavement necessary for a main traffic artery of travel is more expensive than that required on ordinary residence streets with little or no traffic. It is hardly fair to make the property fronting on such a travelled thoroughfare pay the additional cost of such paving for the benefit of a heavy through traffic, which originates far away and probably passes through without service or benefit to the abutting property owner. Paying the other fellow's bill is always unpopular, and this sense of injustice stops by protest many a paving project of urgent importance. San Francisco and other cities are therefore paying from one-third to one-half the original cost of pavements on such thoroughfares. In Berkeley recently, San Pablo Avenue, running across the west end of the town from Oakland on the south to Richmond on the north, had to be repaved with a wide, heavy-traffic pavement, for a long stretch, where the total cost of pavement was more per foot than the sale value of the abutting property. The county, therefore, paved one-half the street as a county highway, in order not to make the burden too heavy or unfair to the abutting owners."

Concerning the width of minor residence streets, the commission said:

"It is imperative to a proper solution of Portland's industrial housing problem for the city to permit the building of 16-foot, 18-foot and 20-foot roadways, (sufficient for two lines of travel, one in each direction) on established minor streets. This does not mean a narrowing of the total street width, which should stay the same, the sidewalk parking area being widened to take up the difference.

"In districts where homes of a value less than $2,500 prevail, the city should also consider permitting sidewalks on one side of the street only, paid for by both sides of the street.

"The city engineer's office informed the commission that the ordinary 36-foot hard surface pavement 6-inch thick, with 6-foot sidewalks on both sides of the street, including curbs and grading, costs approximately $6.25 per running foot on each side per lot, where the ground is reasonably level or only slightly sloping. An 18-foot pavement with 5-foot sidewalks would cost only $4.00 per running foot. This would make a saving of $132.50 on a 50-foot lot, a very considerable item proportionally when the ordinary wage-earner cannot afford an improved lot that costs more than $400 to $500, with all street improvements.

"Serious consideration also should be given the question as to whether a 16-foot pavement with one sidewalk or no sidewalks at all is not amply sufficient. In a number of the newer suburbs of this country and in the garden cities of England, such an arrangement for the minor residential streets has often been used with success. Certainly no traffic originates on such residence streets requiring a greater width of roadway than 16 feet, and the narrower pavement is much less attractive to speeders.

"Considered from this new point of view, some municipalities have begun to realize that a lot of money put into paving which is now unnecessary could have been used to splendid advantage in other ways.

Thus Berkeley, in an exact measurement made in 1914 by a reputable engineer, discovered $187,000 of needless paving in one typical square mile of the city; at which rate it was figured that there must be a total of between $2,000,000 and $3,000,000 of paving in the whole city limits laid out to no purpose. This same expenditure would have parked most of the city, or built many needed schools and other public works, or saved the tax payers in other ways.

"Following this showing by the City Planning Commission, the City Council on April 30th, 1919, passed a resolution establishing 20-foot roadways between curbs as a standard for minor residential streets, and since that time the city engineer has referred all proposed new paving to the commission for determination as to whether the street is of a minor residential character, as evidenced by the progress of zoning investigation to date.

"Portland can rightfully boast of having probably more miles of well-paved streets than any other city on the Coast, but this paving has placed a burden on the cost of land which is serious, and perhaps retarding the building of homes in some areas. Before further paving of this kind is undertaken the city must consider every possible means where savings can be made on minor streets, so that more paving can be put down to link up and widen major traffic arteries.

"Once minor residential streets are determined upon, it becomes evident that 200-foot blocks, particularly in outlying districts, are an extravagance; in fact, 400 and 500-foot residential blocks are a protection from the intrusion of needless traffic. It should be evident that for every 460-foot block cut up into two 200-foot blocks, with a 60-foot cross street between them, the original land subdivider has had to add 15 per cent more to the cost of each lot than he would if permitted to cut his blocks 460 feet long, to make up for the land lost or wasted in the extra cross street. Preliminary observation of the city seems to indicate that the short 200-foot blocks place a very heavy burden of overhead expense for this land lost in unnecessary streets, and for their paving, a burden not usual to most cities. Except in the central downtown business part of the city, it might be advisable to consider relieving this expensive burden by closing those portions of streets not needed."

## BRIDGE LIGHTING IN BALTIMORE.

A part of the description of "Street Lighting in Baltimore" was omitted from the issue of August 16th for lack of space, and is given below.

All city bridges have been equipped with up-to-date systems of electric lighting. The lights are lighted and extinguished automatically by means of a time switch, half the number of the lamps on these bridges being extinguished at midnight and the remainder at daylight.

The department has been put to considerable expense in making extensive repairs to the Hanover Street Bridge because of the defective wiring in the fixtures, but under agreement the expense involved is charged to the State Roads Commission. There has been considerable damage done to the lamps and globes owing to persons maliciously breaking the glassware. In fact, the department was required during the month of December temporarily to place three watchmen on the bridge, in shifts of eight hours each, to break up this practice. The Police Department has helped very materially by apprehending those responsible for the breaking of lamps on the several bridges, alleys and streets, and fines were collected from the guilty parties.

During the year 78 gas lamps, 56 electric lamps, 408 gas lamp globes and 132 electric arc lamp globes were wrecked or broken, caused largely by reckless and indifferent driving. These lamps and fixtures were repaired and replaced by the contractors, as required by the terms of their contract.

# WATER RATES AND FIRE PROTECTION CHARGES

## Data from Several Hundred Cities of the United States—Maximum and Minimum Rates—Receipts for Public Hydrants and Private Fire Protection—Supplementary Data, Recently Received.

| City and State. | Municipal or Private. | Maximum Meter Rates Rate. | For consumption less than | Minimum Meter Rates. |
|---|---|---|---|---|
| **abama:** | | | | |
| Mobile | Municipal | 15c per M | 10,001 | 10c per M |
| **lifornia:** | | | | |
| Eureka | Municipal | 32c per M | 10,001 | 20c per M |
| Ontario | Municipal | 10c per 100 cu. ft. | 1,001 cu. ft. | 5c per 100 cu. ft. |
| Pacific Grove and four other municipalities | Private | 36 2-3c per 100 cu. ft. | 301 cu. ft. | 25c per 100 cu. ft. |
| San Francisco | Private | 24c per 100 cu. ft. | 3,301 cu. ft. | 18c per 100 cu. ft. |
| Santa Rosa | Municipal | 25c per M | 10,001 | 15c per M |
| **lorado:** | | | | |
| Longmont | Municipal | 15c per M | 50,001 | 3½c per M |
| **nnecticut:** | | | | |
| New Britain | Municipal | 10c per 100 cu. ft. | 100,001 cu. ft. yearly | 5½c per 100 cu. ft. |
| New London | Municipal | 12c per 100 cu. ft. | 20,001 cu. ft. | 4½c per 100 cu. ft. |
| Windsor | Municipal | 25c per 100 cu. ft. | 1,001 cu. ft. daily | 16½c per 100 cu. ft. |
| **inois:** | | | | |
| Elgin | Municipal | 19c per 100 cu. ft. | ........ | 5¼c per 100 cu. ft. |
| Freeport | Private | 28¾c per 100 cu. ft. | 201 cu. ft. | ........ |
| Rock Island | Municipal | 14c per 100 cu. ft. | 10,001 cu. ft. per quarter | 6c per 100 cu. ft. |
| Springfield | Municipal | 12½c per 100 cu. ft. | 7,500 gal. | 5c per 100 cu. ft. |
| **diana:** | | | | |
| Elwood | Private | 30c per M | 1,001 daily | 18c per M |
| Indianapolis | Private | 16c per M | 7,500 | 5½c per M |
| Lafayette | Municipal | 20c per M | 15,001 monthly | 6c per M |
| Marion | Municipal | 15c per M | 15,001 per quarter | 6c per M |
| New Albany | Private | .1492c per M | 500 gal. daily average | .0497c per M |
| Richmond | Private | 20c per M | 10,001 monthly | 5¾c per M |
| Union City | Municipal | 10c per 100 cu. ft. | 3,001 cu. ft. | 6c per 100 cu. ft. |
| **wa:** | | | | |
| Albia | Municipal | 50c per M | 1,501 gals. monthly | 15c per M |
| Council Bluff | Municipal | 35c | 501 daily | 8c |
| Creston | Private | 35c | 501 | 15c |
| Fairfield | Municipal | 40c | ........ | ........ |
| Iowa City | Private | 12c per 100 cu. ft. | 5,001 cu. ft. | 6c per 100 cu. ft. |
| Osage | Municipal | 30c per 100 cu. ft. | ........ | ........ |
| Stanton | Municipal | ........ | ........ | ........ |
| **nsas:** | | | | |
| Olathe | Municipal | 36c | 1,401 | ........ |
| Pittsburg | Municipal | 22½c | 150,001 | 19c |
| Topeka | Municipal | ........ | ........ | ........ |
| Wellington | Municipal | ........ | ........ | ........ |
| **ntucky:** | | | | |
| Richmond | Private | ........ | ........ | ........ |
| **uisiana:** | | | | |
| Alexandria | Municipal | 30c per M | 60,001 monthly | 12c per M |
| Baton Rouge | Private | 35c per M | 30,001 monthly | 10c per M |
| **ine:** | | | | |
| Calais | Private | 30c per 100 cu. ft. | 1,001 cu. ft. monthly | 10c per 100 cu. ft. |
| **ssachusetts:** | | | | |
| Athol | Municipal | 25c per 100 cu. ft. | 1,001 cu. ft. monthly | 5c per 100 cu. ft. |
| Brockton | Municipal | 19c per 100 cu. ft. | 18,001 cu. ft. quarterly | 10c per 100 cu. ft. |
| Farmington | Municipal | 25c per 100 cu. ft. | 61 cu. ft. daily | 9c per 100 cu. ft. |
| Haverhill | Municipal | 16c per 100 cu. ft. | 301 cu. ft. daily average | 7½c per 100 cu. ft. |
| Millbury | Private | 45c per M | 2,001 daily | 25c per M |
| Medway | Municipal | 30c per 100 cu. ft. | ........ | 12c |
| Monson | Municipal | 30c per M | 20,001 annually | 8c per M |
| North Adams | Municipal | 1.1c per 100 cu. ft. | 20,001 cu. ft. | 0.5c per 100 cu. ft. |
| Oxford | Private | ........ | ........ | 12c |
| Spencer | Municipal | 20c per 100 cu. ft. | 5,001 cu. ft. quarterly | 5c per 100 cu. ft. |
| Turner's Falls | ........ | 15c per M | ........ | 7½c per M |
| Winchester | Municipal | 20c per M | Flat rate | ........ |
| Winthrop | Municipal | Flat rate | ........ | ........ |
| **chigan:** | | | | |
| Ann Arbor | Municipal | 25c per M | ........ | 10c per M |
| Marquette | Municipal | 10c per 100 cu. ft. | 7,001 cu. ft. | 3c per 100 cu. ft. |
| Midland | Municipal | ........ | ........ | ........ |
| Paw Paw | Municipal | ........ | ........ | ........ |
| **nnesota:** | | | | |
| Morehead | Municipal | ........ | ........ | ........ |
| Willmar | Municipal | 35c per 100 cu. ft. | 500 ft. monthly | 6c per 100 cu. ft. |
| **ssissippi:** | | | | |
| Tupelo | Municipal | 15c per 100 cu. ft. | ........ | ........ |
| **ssouri:** | | | | |
| Fulton | Municipal | 33 1-3c per M | 15,001 cu. ft. | 15c per 100 cu. ft. |
| Washington | Municipal | 30c per M | ........ | ........ |
| **ntana:** | | | | |
| Bozeman | Municipal | ........ | ........ | ........ |
| Deer Lodge | Private | 16c | 1,001 | 8c |
| Glendive | Municipal | 40c per 100 cu. ft. | 401 cu. ft. | 15c per 100 cu. ft. |
| **w Hampshire:** | | | | |
| Dover | Municipal | 25c per 100 cu. ft. | 13,001 cu. ft. | 15c per 100 cu. ft. |
| **w Jersey:** | | | | |
| Dover | Municipal | 22c per 100 cu. ft. | ........ | ........ |
| Helmetta | ........ | Water free§ | ........ | ........ |
| **w Mexico:** | | | | |
| Raton | Municipal | 40c | 5,001 | 6c |
| **w York:** | | | | |
| Amityville | Private | 40c per M | ........ | 15c per M |
| Binghamton | Municipal | 6c per M | 48,661 per year | 4½c per M |
| Carthage | Municipal | 40c per 100 cu. ft. | 8,001 cu. ft. semi-annually | 6c per 100 cu. ft. |
| Cortland | Municipal | 15c per 100 cu. ft. | 3,751 per day | 7½c per 100 cu. ft. |
| Glens Falls | Municipal | 12c per 100 cu. ft. | 20,001 | 2½c per 100 cu. ft. |
| Hempstead | Municipal | 30c | ........ | 10c |
| Jamestown | Municipal | 15c per 100 cu. ft. | ........ | ........ |
| Kingston | Municipal | 16 2-3c per 100 cu. ft. | 1,500 cu. ft. per quarter | 5c per 100 cu. ft. |
| Oneonta | Private | 5c per 100 | ........ | 2c per 100 |
| Oswego | Municipal | 25c | 36,001 per month | 3c |
| Waterloo | Private | 46½c per M | 7,001 | 20c per M |
| **rth Carolina:** | | | | |
| Durham | Municipal | 25c per M | 100,001 per quarter | 12c per M |
| Newbern | Municipal | 25c per M | 2,001 | ........ |
| Oxford | Private | 45½c per M | 3,301 per month | ........ |
| Raleigh | Municipal | 25c per M | 30,001 per month | 7c per M |
| **rth Dakota:** | | | | |
| Mandan | Municipal | 40c per M | 5,001 per month | 15c per M |
| Valley City | Municipal | 30c per 100 cu. ft. | 2,001 cu. ft. | 8c per 100 cu. ft. |

## METER RATES AND FIRE PROTECTION (Continued).

| City and State. | Municipal or Private. | Maximum Meter Rates | | Minimum Meter Rates. |
|---|---|---|---|---|
| | | Rate. | For consumption less than | |
| **Ohio:** | | | | |
| Barberton .............. | Municipal | 20c per M | 10,001 | 15c per M |
| Defiance .............. | Municipal | 40c | ........ | 8c |
| Middletown .............. | Municipal | 13½c per 100 cu. ft. | 1,001 cu. ft. | 7c per 100 cu. ft. |
| St. Marys .............. | Municipal | 20c per 100 cu. ft. | ........ | ........ |
| Toledo .............. | Municipal | 8c per 100 cu. ft. | 60,001 | 4c per 100 cu. ft. |
| Wauseon .............. | Municipal | 25c per M | 50,001 | 20c per M |
| **Oklahoma:** | | | | |
| Tulsa .............. | Municipal | 25c | 3,001 | 4c |
| **Oregon:** | | | | |
| La Grande .............. | Municipal | 15c per M | 5,001 | 5c per M |
| **Pennsylvania:** | | | | |
| Ambler .............. | Private | ........ | ........ | ........ |
| Emporium .............. | ........ | 50c | 10,001 | 10c |
| Ford City .............. | Municipal | 20c per M | 5,001 | 15c per M |
| Franklin .............. | Municipal | 35c per M | 10,001 per quarter | 6c per M |
| Gettysburg .............. | Private | 25c per M | 501 | 12c per M |
| Hanover .............. | Private | ........ | ........ | ........ |
| Lansford .............. | Private | 25c per M | Straight | $1.50 per quarter |
| Lehighton .............. | Private | ........ | ........ | ........ |
| Norristown .............. | Private | 25c per 100 cu. ft. | ........ | 6c per 100 cu. ft. |
| Oil City .............. | Municipal | 20c per M | ........ | 6c per M |
| Pottsville .............. | Private | 20c per M | 7,500 gals per month | 8c per M |
| Reading .............. | Municipal | 4c per 100 cu. ft. plus $3 per mo. for 8-in. connection | Straight | 4c per 100 cu. ft. plus 20 per month for ½-in. connection |
| Wellsboro .............. | Private | 10c per 100 cu. ft. | 50.000 cu. ft. per quarter | 2½c per 100 cu. ft. |
| **Rhode Island:** | | | | |
| Providence .............. | Municipal | 20c per M | 100,000 cu. ft. per quarter | 10c per M |
| **South Dakota:** | | | | |
| Mitchell .............. | Municipal | 50c per 100 cu. ft. | 300 cu. ft. per quarter | 10c per 100 cu. ft. |
| **Texas:** | | | | |
| Amarillo .............. | Private | 50c per M | 10,000 gals per month | 40c per M |
| Dallas .............. | Municipal | 25c per M | 10,000 gals per month | 15c per M |
| El Paso .............. | Municipal | *18.75c per 100 cu. ft. | ........ | ........ |
| McKinney .............. | Municipal | 40c per M | ........ | 30c per M |
| Taylor .............. | Private | 33 1-3c per M | 1,000 gals. per day | ........ |
| Waco .............. | Municipal | 37½c per M | 2,000 gals. per month | 6c per M |
| **Vermont:** | | | | |
| Bennington .............. | Municipal | 30c per M | 70,000 gals. per month | 8c per M |
| Essex Junction .............. | ........ | ........ | ........ | 12c per M |
| **Virginia:** | | | | |
| Charlottesville .............. | Municipal | ........ | 18,000 gals. per quarter | ........ |
| **Washington:** | | | | |
| Bellingham .............. | Municipal | 60c per 100 cu. ft. | ........ | 6c per 100 cu. ft. |
| **West Virginia:** | | | | |
| Fairmont .............. | Municipal | 30c per M | 10,000 gals. per month | 10c per M |
| **Wisconsin:** | | | | |
| Two Rivers .............. | Municipal | 14c per 100 cu. ft. | Straight | ........ |

## METER RATES AND FIRE PROTECTION (Continued).

| City and State. | Minimum Meter Rates for consumption more than | Increase since before the war. | City pays for fire hydrants. | Charge for private hydrants or sprinklers. |
|---|---|---|---|---|
| **Alabama:** | | | | |
| Mobile .............. | 10,000 | None | Nothing | $12.50 for fire hydrants, 5c. pe year per sprinkler head |
| **California:** | | | | |
| Eureka .............. | 10,000 | None | $30 per year | Nothing |
| Ontario .............. | 1,000 cu. ft. | None | Nothing | Nothing |
| Pacific grove and four other municipalities... | 1,000 cu. ft. | About 20% | $36 per year | $24 for 2-in. to $36 for 4-in. fir service |
| San Francisco .............. | 33.300 cu. ft. | None | $30 per year | ........ |
| Santa Rosa .............. | 30,000 | None | Clerk's estimate | ........ |
| **Colorado:** | | | | |
| Longmont .............. | 750,000 | None | $10 per year | Nothing |
| **Connecticut:** | | | | |
| New Britain .............. | 1,000,000 cu. ft. yearly | None | Nothing | Nothing |
| New London .............. | 60,000 cu. ft. | None | Nothing | Nothing |
| Windsor .............. | 5,000 cu. ft. daily | None | $30 | $30 |
| **Illinois:** | | | | |
| Elgin .............. | ........ | None | Nothing | Nothing |
| Freeport .............. | ........ | 15% | Flat rate plus main and hydrant rental | Special rates |
| Rock Island .............. | 40,000 cu. ft. per quarter | None | Nothing | Nothing |
| Springfield .............. | 400,000 gal. | None | Nothing | Everything metered |
| **Indiana:** | | | | |
| Elwood .............. | 3,000 daily | 20% | 138 hydrants at $60; 4 at $50 each | Special |
| Indianapolis .............. | 1,000,000 | About $60,000 | $45 per year | $50 per year |
| Lafayette .............. | 1,030,000 monthly | None | Nothing | $10 to $25 per year |
| Marion .............. | 75,000 per quarter | None | Nothing | Nothing |
| New Albany.............. | 150,000 gal daily average | 5% | $60 for 1st 200 ($50 for balance) | $50 for hydrants, $55 up to 1,00 heads, all over 5c. per head per year |
| Richmond .............. | 10,000,000 monthly | None | $55 credit | 1-in. $9 per year to 6-in. $120 |
| Union City.............. | 6,000 cu. ft. | None | No credit | Nothing |
| **Iowa:** | | | | |
| Albia .............. | 120,000 gals. monthly | None | Nothing | All metered |
| Council Bluff .............. | 18,750,000 monthly | Minimum from 500,000 to 18.750,000 gal. | $1,000 by tax levy | Nothing |
| Creston .............. | 4,000 | None | $40 | ........ |
| Fairfield .............. | ........ | None | Nothing | ........ |
| Iowa City .............. | 50,000 cu. ft. | None | $45 per year | Have none |
| Osage .............. | ........ | None | No credit | Nothing |
| Stanton .............. | ........ | None | ........ | ........ |
| **Kansas:** | | | | |
| Olathe .............. | ........ | None | ........ | Nothing |
| Pittsburg .............. | ........ | Reduced 50% | $25 | Metered |
| Topeka .............. | ........ | None | $13.50 per year | Nothing |
| Wellington .............. | ........ | None | $36 per year | Nothing |
| **Kentucky:** | | | | |
| Richmond .............. | ........ | 10% | $45 per year | Metered |
| **Louisiana:** | | | | |
| Alexandria .............. | 600,000 monthly | 50% | $40 per year credit | $25 per year |
| Baton Rouge .............. | 500,000 monthly | None | $50 | $50 |
| **Maine:** | | | | |
| Calais .............. | 3,000 cu. ft. monthly | About 40% | $80 per year | $60 for hydrants per year, 10c. fo sprinkler heads per year |
| **Massachusetts:** | | | | |
| Athol .............. | 20,000 cu. ft. monthly | None | $50 per year | Nothing |
| Brockton .............. | 27,000 cu. ft. quarterly | About 20% | No appropriation | Cost of installation and main tenance |
| Farmington .............. | 2,200 cu. ft. daily | None | $27.50 per year | $27.50 per year: sprinklers metered |
| Haverhill .............. | 2,000 cu.ft. daily average | 15% | Nothing | Nothing |

## METER RATES AND FIRE PROTECTION (Continued).

| City and State. | Minimum Meter Rates for consumption more than | Increase since before the war. | City pays for fire hydrants. | Charge for private hydrants or sprinklers. |
|---|---|---|---|---|
| **Massachusetts (continued):** | | | | |
| Millbury | 8,000 daily | Slight | ........ | ........ |
| Medway | ........ | $2 minimum per year | $15 | Nothing |
| Monson | 1,000,000 annually | None | Nothing | $10 for hydrants, $50 for sprinklers per year |
| North Adams | 500,000 cu. ft. | None | No account opened | Nothing |
| Oxford | 2,500 | 20% | $55 | $55 for hydrants, $33 per 100 sprinklers |
| Spencer | 10,000 cu. ft. quarterly | None | Nothing | Owners pay installation |
| Turner's Falls | To other water districts | None | Nothing | Nothing |
| Winchester | ........ | None | No credit or charge | ........ |
| Winthrop | ........ | Reduced 4½% | $10 at present | 20c per 1,000 gal. for all used. |
| **Michigan:** | | | | |
| Ann Arbor | ........ | ........ | $40 per year | $25 per year |
| Marquette | 21,000 cu. ft. | ........ | $25 per year | Nothing |
| Midland | ........ | None | Nothing | ........ |
| Paw Paw | ........ | None | Nothing | ........ |
| **Minnesota:** | | | | |
| Morehead | ........ | None | $5 per year | Metered |
| Willmar | ........ | None | $30 per year | Nothing |
| **Mississippi:** | | | | |
| Tupelo | ........ | None | Nothing | Nothing |
| **Missouri:** | | | | |
| Fulton | 15,000 cu. ft. | None | Nothing | Have none |
| Washington | ........ | None | Nothing | Meter rate |
| **Montana:** | | | | |
| Bozeman | ........ | None | Nothing | Have none |
| Deer Lodge | ........ | None | ........ | $3.50 to $5 per month |
| Glendive | 39,600 cu. ft. | From $1 to $1.60 minimum flat rate | 72 hydrants, $25 each per year | Installation and maintenance |
| **New Hampshire:** | | | | |
| Dover | 53,000 cu. ft. | None | $3,000 for all municipal purposes | None |
| **New Jersey:** | | | | |
| Dover | ........ | None | $35 per year credit | $25 per year |
| Helmetta | ........ | ........ | ........ | Nothing |
| **New Mexico:** | | | | |
| Raton | 1,200,000 | None | Flat | $40 and $50 per year |
| **New York:** | | | | |
| Amityville | ........ | None | $25 | $25 |
| Binghamton | 292,000 per year | None | Nothing | Nothing |
| Carthage | 50,000 cu. ft. semi-annually | None | ........ | ........ |
| Cortland | 1,000,000 per day | None | $33.33 per year | Figured on floor space |
| Glens Falls | 20,000 | None | Nothing | Nothing |
| Hempstead | ........ | None | Nothing | 6c. per foot frontage |
| Jamestown | ........ | None | $12,000 per year for all municipal use | Nothing |
| Kingston | 40,000 cu. ft. per quarter | None | Nothing | $25 per year |
| Oneonta | ........ | None | $25 per year | Sprinklers 4-in., $30; two 4-in. connections, $50 |
| Oswego | 3,000,000 per month | None | Nothing | 4-in. line, $5; 6-in. line, $10 |
| Waterloo | 32,000 | From $2 to $3.25. Consumption decreased from 8,000 to 7,000 | $5,000 | $4 per year |
| **North Carolina:** | | | | |
| Durham | 13,000,000 | ........ | $50 per year | $50 per year |
| Newbern | ........ | None | $50 per year | $50 per year for hydrants; sprinklers, $1 per 1,000 cu. ft. |
| Oxford | ........ | From $1 to $1.50 minimum rate | $3.33 | $3.33 |
| Raleigh | 1,000,000 per month | None | $10 per year credit | $40 per hydrant or sprinkler outside of city |
| **North Dakota:** | | | | |
| Mandan | 100,000 per month | None | Nothing | Regular water rate |
| Valley City | 15,000 cu. ft. | None | $15 per year | ........ |
| **Ohio:** | | | | |
| Barherton | 10,000 | About 33⅓% | $690 for municipal uses | ........ |
| Defiance | ........ | None | Nothing | 5c sprinkler head |
| Middletown | 10,000 cu. ft. | About 25% | $30 per hydrant | Metered |
| St. Marys | ........ | 33⅓% | Nothing | ........ |
| Toledo | 300,000 | None | Nothing | 2-in., $3, to 8-in., $15 per year |
| Wauseon | 50,000 | None | Nothing | Nothing |
| **Oklahoma:** | | | | |
| Tulsa | 500,000 per month | None | Nothing | Nothing |
| **Oregon:** | | | | |
| LaGrande | 100,000 | None | Nothing | ........ |
| **Pennsylvania:** | | | | |
| Ambler | ........ | ........ | $25 per year | ........ |
| Emporium | 100,000 | None | $25 | $25 |
| Ford City | 5,000 | None | ........ | ........ |
| Franklin | 2,500,000 per quarter | None | $20 | Nothing |
| Gettysburg | 2,000 | None | $400 per year | $25 per year |
| Hanover | ........ | None | $150 per month | Hydrant, $25; 6-in. sprinkler connection, $50 per year |
| Lansford | ........ | Proposed | $10 per year | $10 per year |
| Lehighton | ........ | None | $15 per year | $15 per year |
| Morristown | ........ | None | Nothing | 4-in., $50 per year; 6-in., $100 |
| Oil City | ........ | None | Nothing | None |
| Pottsville | 82,500 gals. per month | None | Nothing | Regular water rates |
| Reading | Straight | None | Nothing | None |
| Wellsboro | 1,000,000 cu. ft. per quarter | None | $15 per hydrant | None |
| **Rhode Island:** | | | | |
| Providence | 400,000 cu. ft. per quarter | None | $20,000 lump sum | Nothing |
| **South Dakota:** | | | | |
| Mitchell | 5,700 cu. ft. per quarter | About 25% | Nothing | Meter rates |
| **Texas:** | | | | |
| Amarillo | 25,000 gals per month | Asked for | $25 each per year | ........ |
| Dallas | 70,000 gals. per month | None | $36 each per year | Nothing |
| El Paso | ........ | None | $52.50 per year | Sprinklers, 15c per M |
| McKinney | Few large consumers | None | Nothing | Nothing |
| Taylor | ........ | None | $50 each per year | $36 per year, 2-in. hydrant |
| Waco | 20,000 gals. per month | None | $10,000 a year for 600 | Nothing |
| **Vermont:** | | | | |
| Bennington | 1,500,000 gals per month | None | $30 | $50 |
| Essex Junction | 30,000 gals. | None | $30 each per year | None used |
| **Virginia:** | | | | |
| Charlottesville | 100,000 gals. per quarter | None | $20 each per year | None |
| **Washington:** | | | | |
| Bellingham | ........ | None | $4 each | Meter rate |
| **West Virginia:** | | | | |
| Fairmont | 50,000 gals. per month | Min. from 6c to 10c† | Nothing | None |
| **Wisconsin:** | | | | |
| Two Rivers | ........ | None | $45 per year | Meter rates |

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*This price inside city limits; outside the limite rate is 26¼c.

†Proposed to make minimum rate apply to consumption in excess of 250,000 gals. per month instead of 50,000.

§Waterworks belong to the Geo. W. Helme Co., so do nearly all the houses, and nearly all residents are employes of the company.

# The WEEK'S NEWS

**Pennsylvania Aids Township Highways—$1,000,000 Health Building for New York City—Control of Public Bathing Places by Florida—Toledo to Extend Water System—Electric Rate War Surcharge in New Jersey Abrogated—Chicago Gas Rates Reduced—Boise Firemen Refuse to Wash Streets—Officials Fight Police Unions in Boston and Jersey City—Buffalo Sells Garbage on "Hog-Price" Basis—Columbus Votes Against Higber Fares.**

## ROADS AND PAVEMENTS

### State Highway Aid for Townships.

Harrisburg, Pa.—Governor William C. Sproul has signed the bill providing for a system of state "rewards" to townships for the construction and improvement of township roads, and for the erection and construction of township bridges, in townships of the second class. An appropriation of $1,000,000 will be available beginning Dec. 1, 1919. The new law takes the place of that which provided for bonsuses of 50 per cent of the amount expended by townships for road work, not exceeding $20 per mile. Bl the terms of the new law, the state highway department will pay rewards when work by the township has been completed and inspected. Rewards will be granted by the commonwealth for improvements of the following nature: Grading and draining a section of road not less than half a mile long; graveling or cindering a graded and drained road not less than half a mile in length; for macadamizing a road or for constructing a Telford macadam road not less that half a mile long; for constructing a concrete, brick or bituminous surfaced road not less than a half mile in length; for the erection and construction of bridges three feet or more span, constructed of concrete or stone or a combination of concrete and stone, or a steel bridge with a floor constructed of materials approved by the state highway department; and for the purchase and installation of culvert and drain pipe. The rewards are to equal 33 1/3 per cent of the cost of the proposed improvements, not to exceed certain sums. All of these rewards will be based on roads the improvement for which is to be a width not less than sixteen feet; and a corresponding reduction or addition i nthe amount of the reward will be made as the width of the improved road is increased or reduced; but no reward shall be made for the improvement of any road less than twelve feet wide.

### To Test Validity of County Unit Road Law.

Indianapolis, Ind.—The validity of the county unit road law enacted by the legislature this year will be tested by bond buyers before bonds covering the cost of the construction of roads under the new law are bought. An injunction suit to prevent the sale of road bonds in Madison county, to meet the cost of building a road in that county under the county unit law, has been filed in the circuit court at Anderson by Breed, Elliott & Harrison, of Indianapolis, dealers in investment securities, according to a statement by George C. Forrey, Jr., vice-president of the company. The suit will be designed to obtain court decisions assuring that such bond issues are valid before bond buyers in the state buy the bonds that will be offered for sale in the various counties Road work under the county unit plan may be delayed for a time until the test case has gone through the supreme court. Mr. Forrey said all bond buyers probably will refuse to buy the county unit road bonds while the case is pending in the courts. The question of the validity of the act, which creates a new taxing unit with an indebtedness limit of 2 per cent. and the alleged unfairness the law apparently will work on certain townships, where much road work already has been done under the three-mile road law, will be raised in the suit. The fact that any road which now can be built under the county unit plan could have been built under the three-mile road law by the separate townships also will be mentioned in the suit. It is pointed out that in some townships where little or no road work has been done under the old law, the taxpayers can now ask the entire county to share its burden of road building through the county unit plan, although other townships in the same county may have built many roads under the old law. It will be shown that increased valuations of taxable property in all counties under the new state tax law would enable townships that were near the limit of their bonded indebtedness to issue bonds for the construction of additional roads under the three-mile law. Mr. Forrey said the suit to be filed will not affect road work contemplated under the direction of the state highway commission.

## SEWERAGE AND SANITATION

### Cannot Locate Detention Hospital in Residential Section.

Lansing, Mich.—A board of health cannot establish and maintain a detention hospital for the treatment of communicable diseases in a thickly settled residential district. This is the decision in a case (Birchard et al v. Board of Health of City of Lansing et al, 169 N. W., 901) decided by the Supreme Court of Michigan. Suit was brought to restrain the maintenance of a detention hospital in a residential district by the board of health of the city of Lansing. The city charter provided as follows: "The said board of health shall have power, and it shall be its duty, to take such measures as shall be deemed effectual to prevent the entrance of pestilential disease into the city, * * * to establish, maintain, and regulate a pesthouse or hospital at some place within the city or not exceeding three miles beyond its bounds." The court in granting the injunction said: "We conclude that the provisions of the charter under consideration do not vest in the defendant board of health the power to locate a pesthouse in a thickly settled residential district, where, by reason of its location, it would be a nuisance, and where its permanent maintenance would work continuing damage to adjoining and nearby property and would result in the destruction of the home in its comfort and well-being; and that the discretion lodged in the board is a discretion to be exercised by it in determining between different lawful locations."

### New York to Have $1,000,000 Health Building.

New York, N. Y.—Dr. Royal S. Copeland, health commissioner, describing the plans for the $1,000,000 health department building to be erected, declares that it will be a model of its kind. The erection of the building has just been made possible by an appropriation granted by the board of estimate. The value of the building will be, Dr. Copeland said, above everything else in the centralization of the health department under one roof and closer co-ordination of effort and increased efficiency. The new building will be of stone and brick, twelve stories high, and will occupy almost the entire area of a plot 100 by 100 feet. "One of the serious defects of the health department," said Dr. Copeland, "is that the interests are too widely scattered. There are five large hospitals under the direction of the department and thousands of patients are treated every day in these hospitals. The director of the bureau of hospitals has his office remote from the health commissioner. Likewise the bureau of laboratories' work is scattered. The director of the bureau of laboratories is a very important member of the commissioner's cabinet, and it is very important that the director of laboratories and the laboratories as well should be in a central building, so that the employes of the department may have the benefit of the education the laboratories can give them. In the new building we expect to have all experts of the department centralized. Three or four floors will be given over to laboratories. We have also felt the need for a meeting place for our physicians, nurses and inspectors, where conferences may be held, and the new building will have a fine auditorium for this purpose. Another floor will be used for a restaurant, kitchen and rest room for female employes of the department. The first floor will be for the bureau of records and another floor will be a modern health station, where clinical work will be done. A floor will also be devoted to a library of medical books."

### State Controls Public Bathing Facilities.

Tallahassee, Fla.—Under the terms of recent legislation, the sanitary control of all swimming pools and public bath-houses in the state, whether privately or municipally owned, is placed under the jurisdiction of the state board of health. The law is based in part upon studies made by George W. Simons, Jr., chief sanitary engineer, state board of health, acting as chairman of the American Public Health Association's committee on swimming pool sanitation, but it is patterned after the law of California, which Mr. Simons says is, so far as he knows, the only other state which has such a law. Under the Florida statute no swimming pool, public bath-house, bathing or swimming place may be constructed, altered or operated without "an unrevoked permit" from the state board of health. Before such permit shall be granted, plans, specifications, and full operating details must be filed with the board. Information must be given as to the source of water-supply, its amount and quality, the proposed method of treating and heating the water and of providing for the cleanliness of bathers, the method of washing and storing bathing suits and towels, and any other data that the board may require. The board is authorized to inspect bathing and swimming places at any reasonable time, and in its discretion may publish the results of the inspections in its monthly bulletin. It may revoke or suspend permits for cause, and likewise may declare any bathing establishment a public nuisance, which nuisance may be abated by either the state or local board of health. Violators of the act are subject to fines of $25 to $500, or to imprisonment in a county jail for not more than six months, or to both fine and imprisonment.

## WATER SUPPLY

### To Increase Toledo Water Supply.

Toledo, O.—Plans to expand the city water works to increase the daily capacity of 34,000,000 gallons of filtered water to 56,000,000 gallons have been announced by service director Goodwillie. Some of the work will be undertaken this fall, and all will be completed next summer. It is expected that the extensions and enlargements will supply the city's requirements for the next 15 years. No further expansions then can be made, engineers figure, for the reason that the limit, in dry seasons of the fresh water supply from the upriver districts of the Maumee will have been reached. The next move, looking away into the future, must be extensions of mains into Lake Erie, at a cost of many millions. The council recently voted two issues of bonds—one $400,000 and the other $450,000—for the extensions the service director now has planned in detail. The $400,000 will be expended at the low-pressure filtration plant near the city limits. Here 22 new filters, each with 1,000,000 gallons daily capacity, will be added. Another settling basin, 500 by 150 by 20 feet, with capacity for 11,250,000 gallons, also will be constructed. There now are two big settling basins at the plant. The peak load on the municipal water works has been as high as the rate of 49,000,000 gallons in 24 hours. This, however, never has continued beyond a few hours in extremely dry and hot weather. The greatest actual water consumption in 24 hours was 35,000,000 gallons on Jan. 12, 1918, the day of the blizzard, when the mercury descended to 16 below zero and everybody's water tap was opened to prevent freezing of the pipes. During the recent hot spell the pumping averaged 26,000,000 gallons daily. A survey, now in progress, is reducing water consumption through the discovery of leaks. One leak, just discovered, was pouring 150,000 gallons of water daily into the canal near Walbridge park. The proceeds of the $450,000 bond issue will be used for extension of mains, principally. Forty-inch and 32-inch mains will be extended from the high pressure pump station at a cost of $300,000. Under previous appropriations, new engines were ordered for both the filtration plant and the main high pressure station. Delivery was held up by the war, but parts have arrived and installation is in progress. Toledo has approximately 40,000 water rent payers, of whom 550—the big factories and railroads—use two-thirds of the water and pay more than half the income of the department in tolls.

### Court Declares Dam Failure "Act of God."

San Diego, Cal.—The Superior Court of California has handed down a decision in the case brought by the landowners of Otay Valley against the city to collect for damages caused by the failure of the Lower Otay dam. This was an earth and rock-fill dam that failed January 27, 1916. The court held that the failure was caused by an "act of God" and that the city is not responsible.

## STREET LIGHTING AND POWER

### War-Time Surcharge Abrogated.

Trenton, N. J.—More than ten thousand customers of the Public Service Electric Company will be benefited by a decision of the public utility commission abrogating the war surcharge of twenty-five per cent. on all bills in so far as it is applicable to customers supplied under the uniform retail power rate and the elevator rate. The surcharge will continue in force, as it applies to the rates for wholesale power, which the commission found are somewhat lower proportionately than for other classes of service and are less than the rates existing in other eastern metropolitan areas for the same class of consumers. The order will become effective September 1, provided the company accepts the modification of the surcharge order, which it must do to prevent setting aside the entire surcharge.

### Gas Rates Reduced in Chicago.

Chicago, Ill.—Ruling that the People's Gas Light and Coke Company has exaggerated its estimate of the revenues needed to avoid bankruptcy, the state public utilities commission has ordered gas rates reduced 3 cents a thousand feet, beginning Aug. 1. The reduction was ordered after an investigation of the company's petition for authority to increase its rates 6 cents a thousand feet. The new rates, as compared with the old, are:

| Amount | Old rate | New rate |
|---|---|---|
| First 350 feet.................... | 37 | 35 |
| Next 10,000 (per 1,000).......... | 88 | 85 |
| Next 40.000 (per 1,000).......... | 82 | 80 |
| Over 50,000 (per 1,000).......... | 65 | 65 |

Bills not paid within the discount period will be subject, as before, to a penalty of 10 cents a thousand feet. The new rates will be in force until April 1, 1920. The company, petitioning for an increase, said that unless an increase were allowed the gas demands next winter could not be met and that the corporation would get into financial difficulties. The commission says this estimate is inaccurate. Engineers for the commission have found that a rate of 69.9 a thousand feet would cover all the company's expenses. The new rate, averaging approximately 84.058 cents, will permit a return of $2,480,00 over all expenses, the commission estimates. The company, in its brief, called attention to its "precarious condition" as evidenced by the net earnings and deficits for the last five years. In 1914, the net earnings amounted to $3.292.467.98. The next year there was a reduction of $63,502.39. Net earnings fell to $2,077,258.16 in 1916. In 1917 and 1918, the brief states, the deficits were $365,201.35 and $1,366,628.54 respectively. Since the emergency rate went into effect the monthly net earning or deficits are as follows: September, 1918, deficit, $86,920.43; October, 1918, earnings,$61,152.55; November, 1918, earnings, $72,997.05; December, 1918, earnings, $88,361.09; January, 1919, deficits, $72,002.62; February, 1919, earnings, $134,158.66; March, 1919, earnings, $30,285.43; April, 1919, earnings, $83,036.33, and May, 1919, deficit, $16,908.27. The requirement of twenty-two candle power gas was described in the brief as resulting in an "economic waste," it being stated that where mantle lights are almost universally used, as is the case in Chicago, such rich gas is unnecessary. In conclusion the company summarized the cost of gas as $.8647 per thousand cubic feet. This figure included the cost of production, distribution, meeting bond interest and other "unavoidable charges." The present rates, it is pointed out, produce but $.8727, which means a margin "too small for practical operation and the restoration of the company's credit." A final plea was made for the commission to act favorably in behalf of the 2,500,000 consumers who are dependent on the company for heat or light, it being stated that there is no way in which the problem can be solved if the commission failed to give the company relief.

### Commission Disaproves Discriminatory Power Contracts.

Charleston, W. Va.—The state public service commission, in authorizing increased rates to provide a net return of approximately 8 per cent on the value of the investment of the Appalachian Power Company, directed the modification of power contracts possessing discriminatory features. It declared on this point: "It is charged by protestants and shown by the evidence that the rates of applicant now in effect are discriminatory as between certain of its power consumers, and this is especially true as to its contracts with the protestants, Carter Coal Company and Pocahontas Fuel Company. From applicant's evidence we find that the Carter Coal Company should pay $2,000 per year additional and the Pocahontas Fuel Company from $10,000 to $20,000 per year additional for the service now being rendered, at the rates now in effect, to place them on an equality with applicant's other consumers of like character. . . Inasmuch as other considerations than the rate granted enter into these contracts, we are unable to determine from the facts before us just what adjustment should be made in relation to the rates of applicant's various consumers in order to place them upon a non-discriminatory basis We are of the opinion that the applicant should at once proceed to modify and revise all of its contracts possessing such discriminatory features. . . Upon the failure or refusal of the applicant, or in the event of its inability to modify said contracts so as to eliminate all unjust discrimination as between its consumers in like class, the commission will, upon its own motion, enter upon an investigation of said contracts and make such order in respect thereto as may seem just, reasonable and proper."

### Commission to Investigate Utilities' Consumers' Deposits.

Albany, N. Y.—The practices of gas and electric corporations in regard to customers' deposits which they are permitted to require under the law is the subject of an investigation taken up by the Public Service Commission, Second District. The law permits these corporations to require a reasonable deposit as protection against nonpayment of bills with the provision that they are to pay "every such depositor legal interest on the sum for the time his deposit shall remain with the corporation." Various practices prevail among companies as to the requirements of consumers' deposits. It is estimated that from 20 to 50 per cent of the users of gas and electricity throughout the State are required to make a deposit before gas or electricity can be secured. No deposits are required in some cities. Other companies only require deposits from users in certain sections of a city or village. One city at least requires a deposit from every customer, but interest at six per cent is credited on the first bill rendered in each year. Other companies pay interest at certain other periods, while a limited number have an arbitrary ruling that no interest shall be paid until the service is discontinued and the deposit returned. The investigation by the Commission is to determine what, if any, regulation shall be made requiring corporations to treat these deposits as trust funds, segregate them, and when and how interest payments shall be made. The corporations object to a requirement that deposits be placed in a trust fund where they will only secure four per cent interest, while they are required to pay depositors six per cent interest. It has been pointed out by the companies to the Commission that the gas business in New York State is over one hundred years old and that only once have users failed to secure a return of their deposits.

## FIRE AND POLICE

### Firemen Refuse to Wash Streets.

Boise, Idaho.—The city's streets will not be washed by the fire fighters in conformity with J. K. White's recent request that this be done in certain parts of the business district once a week during the dry season. At the regular meeting of the firemen's union a vote was taken on the proposal, which was defeated by 12 to 6. When the original request of the public welfare board was made the city council proposed to fire chief Foster that, inasmuch as the firemen were given the two-platoon system, they would be willing to do this work for the city. The street area to be washed includes twelve blocks altogether. The firemen said they felt that, inasmuch as they have already conceded part of their wage demand to the city, and that the council wanted them to do this work during their off hours, they felt the proposal to be unjust. Fire chief Foster says the day-shift men originally consented to perform the work, but action of union members later nullified this. "There are two crews and 36 men in each shift," said the chief. "I estimated if this work was done by the firemen it would necessitate each man's working but one hour every six weeks."

### Mayor Forces Firemen to Suspend Their Paper.

New York, N. Y.—The Uniformed Firemen's Association at a meeting voted to discontinue the publication of their organ, "The Fireman," following receipt of an order by mayor Hylan conveyed to them by fire commissioner Drennan directing that the publication be suspended. There will be one more issue to carry out advertising contracts. Many of the firemen openly criticized the mayor, and there was talk of the firemen going on strike. The leaders advised that instead of striking now for more pay the firemen wait and see whether or not the board of estimate would increase their salaries. Only the intervention of James P. Holland, president of the American Federation of Labor of New York, who counseled submission to the order, averted a negative vote on the proposal to suspend the publication. Mr. Holland pointed out that dismissal of the men connected with the paper would result should they persist in issuing it, and that none of them could afford to lose their jobs and the pensions they would be entitled to when their term of service expired. Five members of the editorial council and three officers of the association were threatened with dismissal in case the publication was not stopped, it was said. There was much feeling among the firemen because of the investigation of the affairs of the paper made by the commissioner of accounts several weeks ago, it being contended that the mayor, in directing the commissoner of accounts to make the investigation, had no more right to do so than he would have to order an investigation of any other publication in the city. A number of the firemen also were aggrieved because they were told by fire commissioner Drennan that under a court ruling they had "no constitutional rights so long as they were firemen." The men denied that any advertisements had been solicited for the paper. Commissioner Drennan said later that it was no doubt better for the department that the paper be discontinued, as merchants might get a wrong impression concerning it. He said that some might suppose it was an organ of the department and perhaps look upon the solicitation of advertisements as a species of blackmail. The commissioner said he was not opposed to the firemen getting more money if the city saw fit to give it to them.

### Try to Keep Police from Unionizing.

Boston, Mass.—Members of the police force, disregarding a recent order of police commissioner Edwin U. Curtis forbidding them from joining any organization outside the department, have organized a union under charter from the American Federation of Labor. Members of the new union said that about 1,400 members of the force took part. The patrolmen were addressed at the organization meeting by Frank H. McCarthy, New England organizer of the Federation; P. Harry Jennings, business agent of the Boston Central Labor Union, and James T. Moriarty, a member of the city council. McCarthy told them that as members of organized labor they would be expected to be faithful to themselves, their brother members and their employer. Jennings said that the policemen would have the backing of 80,000 union members. The order of the police commissioner forbade members of the force joining any organization outside the department "composed of present or present and past members of the force," except posts of the G. A. R., Spanish War Veterans and the American Legion. The commissioner said that the men could not fulfill their duties properly if they were subject to orders from any outside organization.

Jersey City, N. J.—A movement to organize the Jersey City police into a labor union to be affiliated with the Federation of Labor has been carried on by some members of the force recently, but it has not until now been taken seriously by the superior officers and a majority of the patrolmen. Mayor Frank Hague has sent a letter to Charles F. X. O'Brien, director of public safety, in which he says his attention has been called to the movement, and that "it presents a most serious situation to the people of Jersey City. If the members of the police department were to be affiliated with the American Federation of Labor it would mean that the members would be serving two masters. In the event of labor troubles the policemen would be placed in the position of having to serve organized labor and at the same time serve the people of Jersey City." The mayor urges the director to investigate. "If it be found that members of the department are guilty of a violation of the rules of the manual in this respect, you should order their suspension and have charges preferred against them, the same as if they had violated any other important rule."

## STREET CLEANING AND REFUSE DISPOSAL

### Garbage Contract Upheld

New York, N. Y.—The decision of Justice Manning denying an application by John J. Snyder, as a taxpayer, to enjoin the municipal officials from carrying out a contract entered into with the New York Sanitary Utilization Company for the removal of the city's garbage, has been unanimously upheld by the Justices of the Appellate Division of the Supreme Court in Brooklyn The court handed down no opinion with the decision. After the Metropolitan By-Products Company, which operated the disposal plant on Staten Island, gave up its contract for the removal of the garbage, the city made an agreement with the New York Sanitary Utilization Company, which was to be paid $1,000 a day for the work. The company has garbage disposal works on Barren Island. Mr. Snyder alleged in his action that the contract meant a waste of public funds and a revival of the old Barren Island odor nuisance. It was held by Justice Manning that the city officials had acted properly in the matter.

### Sells Garbage on Hog Price Basis.

Buffalo, N. Y.—After various negotiations during the last few months, city finally decided to let a five-year contract for garbage disposal by feeding to hogs. The contractor, Dr. T. B. Huff, offers to pay 50 cents a ton as a minimum, with increases varying with the price of live hogs on the Chicago market and the quantity of separated garbage delivered yearly by the city. Regardless of yearly total, the contractor is to pay the city a price per ton of garbage six times the Chicago price of live hogs. If the yearly garbage total exceeds 30,000 tons, the multiple becomes seven, and if it exceeds 40,000 tons it will be eight. These multiples are to be based on average monthly prices and on corresponding monthly totals. The city agrees to employ two and, if need be, three inspectors; to carry on an education campaign for separation of garbage from other city refuse; to pass and enforce an ordinance prohibiting any collections except by the city; and to make daily deliveries to the feeding platforms, except on Sundays and holidays. The contractor agrees to be ready Oct. 1 to accept all garbage delivered by the city, and expects to accept some before that time. A tentative agreement has been made with the International Agricultural Corporation to continue to treat the garbage by reduction from the time of the expiration of its contract Aug. 1 until arrangements for feeding can be made, doing the work on the cost-plus basis.

## TRAFFIC AND TRANSPORTATION

### Court Sustains 6-Cent Fare Despite Franchise Limits.

Wilkinsburg, Pa.—According to the Superior Court of the state, a fare-fixing clause in an electric railway franchise cannot block a justifiable increase in rates. The ruling was made in an opinion by Judge Troxler on the appeal of the borough of Wilkinsburg in its contest of the 1918 fare increase by the Pittsburgh Railways from 5 cents to 5½ and 6 cents. Wilkinsburg franchises include a 5-cent fare clause. The appellant had argued that increase of fare in the face of the 5-cent fare clause constituted a breach of the constitutional guarantee of contracts. Judge Troxler declined to agree. When an electric railway increases its fare in accordance with the provisions of the public service commission law, as the Pittsburgh Railways did in this instance, Judge Troxler said the police power of the State has been invoked. This power cannot be abridged, and any contract in the franchise must be considered to have been entered into by the contracting parties, with a reservation in favor of it. Therefore, a change in tariff, accomplished by virtue of the State's police power, cannot be considered a breach of contract within the constitutional meaning. It is right that the police power should cover the matter of fares, the opinion explains, because of the general public's stake in the matter. Street railways are no longer local concerns supplying only one community each, but are now competitors of steam railroads carrying freight and passengers long distances. As such it is desirable that they be controlled by the more extensive authority of the State. In another opinion issued the same day Judge Troxler upheld the Common Pleas Court of Allegheny County in dismissing a bill brought by the city of McKeesport, which sought to prevent violation of its 5-cent fare ordinance at the same time by injunction proceedings. The lower court had dismissed the bill upon demurrer on the ground of no jurisdiction except upon appeal from the Public Service Commission, which had not yet acted on the raise. The Superior Court did not rule on this phase of the issue, merely observing that if its other opinion were correct, the 5-cent fare clause could not stand in the way of the increase anyway, and the same result would follow, even granting the lower court had jurisdiction. Both of these opinions were handed down as applicable to several similar suits brought by Pittsburgh and a number of the surrounding boroughs as a result of the same increase. Charles K. Robinson, chief of the Pittsburgh bureau for traction litigation, has announced that the city will appeal to the Supreme Court.

### Vote Against Higher Fares.

Columbus, O.—The ordinance giving the Columbus Railway, Power & Light Company an increase in fare from eight tickets for a quarter to six tickets for a quarter was defeated by 4,525 votes at a recent special election. After having been approved by the council the matter was referred to the voters. The company has announced that it can now give the people only the kind of service they have chosen by vote. The first move in this direction came when the company announced that service would have to be curtailed in order to accumulate the back pay due employes from an award of the War Labor Board. The company's statement says: "The general conditions and the special need is that the company should, after the long and patient waiting of the loyal and efficient employes for back wages, now take steps in any way reasonably possible, to make them some further restitution. Ten per cent of this back wage was paid last May and it is due that further payments on this account be made soon. All the restrictions and curtailments now contemplated by the company are fully within its franchise requirements. We very much hope that any or all of the restrictions in service mentioned will be considered as due to conditions beyond our control, and that car riders will consider and believe that it is the desire of the company to do at all times the best it can to serve the interests of the public."

## MISCELLANEOUS

### Capital to Be Zoned.

Washington, D. C.—A zoning commission for the District of Columbia is proposed by Senate bill 1369, which has been introduced by Senator Calder of New York. The commission would be composed of the three commissioners of the District of Columbia, the officer in charge of public buildings and grounds of the District and the superintendent of the United States Capitol building and grounds. Within six months of the passage of the act the commission would divide the District of Columbia into height, area and use districts. The bill has the approval of the District commissioners.

### Municipalities Join in Town Planning.

Montreal, Canada.—The four municipalities of Longueuil, St. Lambert, Greenfield Park and Montreal South, situated on the St. Lawrence River opposite to the city of Montreal, have joined together for town planning purposes. The idea emanated with the South Shore Board of Trade whose members are drawn from the four towns. A committee or board was formed and each of the local councils invited to send two delegates, with the result that it was enabled to engage the services of Messrs. Ewing, Lovelace and Tremblay, consulting engineers. This firm is preparing a plan of the area to be included in the town-planning scheme, which will show all the physical features, both natural and artificial, including the public and semi-public buildings. With this plan, which is expected to be ready about October 1, as a basis, the Board intends to lay aut a scheme of highways, industrial, business and residential areas, parks, sites for future public buildings, railways and harbor facilities, etc This is the "town plan" and it will be submitted to the citizens for their criticism and discussion. When an acceptable town plan has been finally developed, the Board hopes to have an act ready for presentation to the Provincial Assembly providing for an authority to which will be entrusted the duty of putting the town plan into effect. The projects of the board have been very favorably received so far by the municipal authorities, who have agreed to meet the cost of the plan.

## LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

### High Sidewalk—Liability of City for Injury.

(U. S. C. C. A. Miss.) A city held not chargeable with negligence, which rendered it liable for injury to a person who fell when starting to cross a street in the evening in the middle of a block, because the sidewalk was some 4 or 5 feet higher than the grade of the street.—Rahm v. City of Vicksburg, 255 F. 541.

### Liabilities Exceeding Income—Bonds to Pay Injury Claim.

(Cal.) Const. art. 11, § 18, prohibiting cities from incurring liability exceeding annual incomes without the assent of two-thirds of the voters, does not prohibit city from issuing a refunding bond to pay a judgment against it for personal injuries, regardless of whether its liabilities exceed its annual income.—City of Long Beach v. Lisenby, 179 p. 198.

### Bonds for Buying Street Railway Not Indebtedness.

(Wash.) Plan of city of Seattle, pursuant to Rem. Code 1915, § 8008, for acquisition of street railway system through issuance of bonds to be paid, with interest, and the expenses of operation and maintenance of the system, from its gross revenues, held not to create any indebtedness against the city, so that the city council had authority to consummate the purchase without the sanction of the qualified voters.—Twichell v. City of Seattle, 179 p. 127.

Contract for electric power to operate street railway system acquired by city of Seattle, pursuant to Rem. Code 1915, § 8008, payment to be made from revenues derived from system, held within power of city council.—Id.

### Power to Prohibit Billboards from Residence Districts—Aesthetic Grounds.

(U. S. Sup.) Billboards properly may be put in a class by themselves, and prohibited in the residence districts of a city, in the interest of the safety, morality, health and decency of the community.—St. Louis Poster Advertising Co. v. City of St. Louis, 39 S. Ct. 274.

Restrictions may be put on billboards in a city, though dangers from fire and wind be done away within their construction, as they are or may be the least of the objections thereto.—Id.

That one or two relatively trifling details of an ordinance as to erection of billboards in a city, especially the requirement of conformity to building line, have aesthetic considerations in view, more prominently than anything else, does not render them invalid, the main burdens imposed standing on other ground.—Id.

### Power of City to Exempt from Taxation.

(Va.) A purchaser of land from a city, a very material part of consideration paid being an invalid agreement of city to exempt property from taxation, has no right of equitable set-off against an annual tax, in absence of a continued service to be rendered to city or proof of amount paid on account of tax exemption covenant.—City of Richmond v. Virginia Ry. & Power Co., 98 S. E. 691.

Municipalities of a state have no power to exempt property from taxation, except as they are expressly authorized by the state.

Acts 1874-75 c. 219, as to taxes, authorizing sale of certain land on such terms as the city shall deem proper, does not empower city of Manchester to exempt such land from taxation; the word "terms," as used in such statute, referring only to terms of payment of purchase money, including manner of securing any deferred payments, etc. (citing Words and Phrases, Terms).—Id.

# NEWS OF THE SOCIETIES

**Sept. 30-Oct. 1-3.—NEW ENGLAND WATERWORKS ASSOCIATION.** Annual meeting, Albany, N. Y. Secretary, Tremont Temple, Boston, Mass.

**Oct. 27-30.—AMERICAN PUBLIC HEALTH ASSOCIATION.** Annual meeting, New Orleans, La. Secretary, A. W. Hedrich, 169 Massachusetts ave., Boston, Mass.

**Nov. 12-14.—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS.** Annual convention, New Orleans, La. Secretary, Charles C. Brown, Springfield, Ill.

### American Association of Engineers.

Unexpected enthusiasm and widespread interest in the work and plans of the A. A. E. are found by President Newell, of the American Association of Engineers, in his visit to the centers of engineering activity, particularly in the middle and far west. The young engineers, notably those recently returned from army or navy service, are putting their surplus energy into the upbuilding of the local clubs and chapters.

The principal cities recently visited by President Newell are Boston, New York, Philadelphia, Baltimore, Washington, Pittsburgh, Buffalo, Cincinnati, Dayton, Omaha, Kansas City, Denver, Salt Lake City, Boise, Seattle and Portland. He is arranging other meetings with the engineers of Sacramento, Los Angeles, San Francisco, San Diego, Tucson and El Paso. At each point visited conferences have been held with the local officers of the A. A. E., followed usually by open meetings to which the public is invited. And when the results and plans of the A. A. E. are explained and discussed, especial interest is shown in the studies of conditions of engineers.

A committee to investigate the compensation of municipal and county engineers, and another to make a similar investigation for engineers employed by public utilities, is being organized by the American Association of Engineers. The committee personnel has not been determined entirely, but it is expected that this will have been done very soon.

The American Association of Engineers has grown so fast during the last six months that the national headquarters of the association in Chicago has outgrown its quarters. Within the next two or three weeks these headquarters will be moved from the present location at 29 So. LaSalle street to the Nepeenauk Building at 63 East Adams street, where a lease has been taken on 6,000 square feet of office space. The Chicago chapter, which has over 1,100 members, and which is now the largest engineering society in Chicago, will take over the space vacated by the national headquarters of the association.

As a result of the recent affiliations of independent engineering societies with the American Association of Engineers, of which the Oregon Society of Engineers is the most recent affiliate, inquiry has been made by a member of the Louisiana engineering society concerning the possibilities of a similar affiliation, and requesting to be advised of the advantages which accrue to a local organization through amalgamation with the A. A. E. For the benefit of other societies who may be interested it is announced that through such an affiliation a local society gains a broader field and becomes a part of a national organization without losing its own autonomy. "It is through such arrangements that engineers will eventually be united in thought and in action, and it is not until engineering effort is correlated through a single organization that the hopes of the profession will be realized."

### Engineering Council.

In furtherance of a plan to determine what changes should be made in the compensation of engineers working for salaries, the state and municipal section of Engineering Council's committee on the classification and compensation of engineers (29 W. 39th street, New York City) has prepared a tentative classification of engineering positions in state, county and municipal service. Copies of this classification accompanied by a questionnaire as to compensation paid July 1, 1915, July 1, 1919, and compensation recommended, are being sent by the section committee named to all state engineers and state highway engineers and to all city engineers in places of 100,000 population and over—a total of 161. Recipients of the questionnaire are requested to vote yes or no as to concurrence in the classification proposed by the committee; to offer remarks upon the "present morale of the service reported on;" and to suggest "the course to be pursued in order to insure recognition." The section committee consists of Arthur S. Tuttle, deputy chief engineer, Board of Estimate and Apportionment, New York City; Frederick W. Cappelen, city engineer, Minneapolis, Minn., and M. M. O'Shaughnessy, city engineer, San Francisco.

### Illuminating Engineering Society.

A tentative list of subjects to be included in the program of 1919 convention of the Illuminating Engineering Society at Chicago, Oct. 21 to 24, inclusive, has been announced by the Papers Committee, of which George H. Stickney, Harrison, N. J., is chairman. A feature of the beginning of the program will be the report of the Committee on Progress which will review not only the normal progress of the year, but the lighting developments during the war, including, if possible, some of the new things which heretofore have not been openly discussed. Searchlights, their development and application during the war, will be another interesting feature.

A paper on "Viaduct Lighting" will describe an installation made without poles or posts and involving an unusual and interesting method of distributing light over the roadway with provisions for reducing glare; this paper is to be accompanied by illustrations and curves. The gas-lighting industry will be represented with a paper on gas street lighting, its present status and recent developments. Recent developments in equipment and applications of electric street lighting will also be discussed.

A paper which will not be printed in advance is one on prospective lighting applications. This will be a "ginger" talk, pointing out the extensive and as yet undeveloped field for the wider application of artificial lighting.

There is also enough of the technical in the program to make it well balanced. "Tests of Lighting Units" will bring out facts about photometric and illumination tests of typical units for interior lighting. "Diffusion of Light" will discuss a study of glare and diffusion in their relation to practical lighting installations. A paper on the "Reflecting Power of Paint" will contain data from careful tests of different colored paints. "Photometry" is the title of a paper which will bring out some ingenious methods of making difficult measurements.

## PERSONALS

Blanchard, Arthur H., has been appointed professor of highway engineering at the University of Michigan to occupy the chair recently established by the Board of Regents. He will retain his consulting office at Broadway and 117th street, New York City, until Sept. 15, after which he will be located in Ann Arbor, Mich.

Matteson, B. W., formerly connected with the city engineer's office, Los Angeles, Calif., is now with the Bureau of Public Roads, Department of Agriculture, with headquartes at Enterprise, Utah.

Long, V. V., has opened offices in the Colcord Bldg., Oklahoma City, Okla., under the firm name of V. V. Long & Co., to conduct an engineering practice, specializing in municipal improvements.

Mitchell, Lieut. Frank, engineers, U. S. A., who recently returned, received his discharge from the service, has been appointed highway engineer of Thomas County, Ga.

Johnson, T. H., has resigned as city engineer of Sioux City, Iowa, and A. M. Schott has been named acting city engineer.

Jenks, Harry N., has returned to this country from Burma, and has become

(*Continued on page 144.*)

## INDUSTRIAL NEWS

**The Nye Odorless Crematory Co.,** Macon, Ga., has issued an "after-war" edition of its booklet on the "Nye Odorless Garbage Crematories for Municipalities." This describes the Nye type of garbage crematory, which has become increasingly popular during the past few years. Many plants of this type were installed for the United States Government at army cantonments, naval bases, nitrate plants, proving grounds and powder plants. The booklet is handsomely gotten up, with a striking cover, and shows a number of views of plants installed. Facts and figures given by officials in charge of these plants should prove of decided interest to those in other cities which are concerned with the problem of garbage disposal. This company is also distributing fine souvenirs in the form of brass paper cutters. A little magazine entitled "The Incinerator" began publication in July.

### Technical Manufacturer Uses Airplane for Advertising.

**The Lakewood Engineering Co.,** Cleveland, Ohio, which manufactures contractors' and industrial equipment, claims to be the first manufacturing concern in the field to advertise from the air. Lieut. Geo. M. Comey, late of the air service of the A. E. F., in a Curtiss biplane, is engaged to distribute the "Lakewood Aerial Bulletin," an advertising broadside, from his plane. The first flight was made over Ohio, August 15. The company manufactures concrete mixers, pavers, clam shell buckets, towers, chutes, electric locomotives, V-dump cars, concrete cars, etc.

**The Sullivan Machinery Company,** Chicago, Ill., announces the appointment of R. S. Weiner as district manager at El Paso, Tex., succeeding Don. M. Sutor. Mr. Sutor has been transferred to the company's St. Louis office as district manager for Missouri, Eastern Texas, Oklahoma, Kansas, Western Kentucky and Western Tennessee. The company's office at El Paso remains at Room 511 Mills Bldg., as heretofore.

Beginning Aug. 1, the promotion and inspection bureaus of the **Universal Portland Cement Company,** 210 So. La Salle street, Chicago, Ill., were combined under the name of "service bureau." J. H. Libberton, formerly "engineer, promotion bureau," and "inspecting engineer," located in the general offices of the company at Chicago, became manager of the service bureau; G. E. Warren, assistant manager; J. W. Lowell, eastern manager, Pittsburgh; J. H. Chubb, northwestern manager, Minneapolis, and O. L. Moore, chief cement inspector, Chicago. The two bureaus which were combined formerly had separate and distinct duties, the promotion bureau handling special service and furnishing of information to cement users, and the inspection bureau having charge of the physical testing at the mills. In combining the two bureaus, service rendered to cement users by the department will in no way be changed, either in policy or scope of the work.

## PERSONALS

(*Continued from page* 143.)

assistant engineer under C. G. Gillespie, director, bureau of sanitary engineering, California State Board of Health, with headquarters at Berkeley.

Haskins, Charles A., recently captain in the Sanitary Corps, U. S. A., on duty in the office of the Surgeon General, has been appointed director of the division of water and sewage, Kansas State Board of Health.

Townley, J. C., formerly superintendent of public works, Ithaca, N. Y., who recently received his discharge from the 23rd Engineers, U. S. A., has been appointed assistant engineer with Hugh L. Cooper & Co., hydro-electric engineers, New York City, with headquarters at Massena, N. Y.

Garrow, T. A., has resigned as city engineer of The Dalles, Ore.

Hinman, Capt. Jack J., Jr., Sanitary Corps, U. S. A., who has been engaged in water-supply work in France, has received his discharge and has returned to his position as water bacteriologist and chemist for the Iowa State Board of Health and assistant professor of epidemiology in the State University of Iowa, Iowa City.

Messenger, F. D., is now on inactive duty as assistant sanitary engineer, United States Public Health Service, and has become an engineer in the office of the state highway department, Lansing, Mich. While in the service he was in charge of antimalarial operations in the Camp Logan zone, Houston, Tex.

Cotterill, George F., chief engineer of the state highway department, Olympia, Wash., since 1916, has resigned. Commissioner James Allen will continue to exercise supervision over the engineering work that is directly administered by resident engineers in the various highway districts.

Hoadley, Robert B., formerly county assistant, New York State Highway Department, with headquarters at Binghamton, and John A. Giles, formerly commissioner of public works and city engineer of Binghamton, have formed the firm of Hoadley & Giles, Phelps Bldg., Binghamton, N. Y. They will conduct a general practice, specializing in municipal work, highways, subdivision and topographical surveys.

Revell, John, who for the past year has been assistant engineer in the construction of Camp Knox, Kentucky, has been appointed chief draftsmen, Kentucky Department of Public Roads, at Frankfort.

### United States Civil Service Examination, Junior Highway Bridge Engineer. September 17, 1919.

The United States Civil Service Comn. announces an open competitive examination for junior highway bridge engineer, for men only, on September 17, 1919. Vacancies in the Office of Public Roads and Rural Engineering, Department of Agriculture, at $1,200 to $1,600 a year, and in positions requiring similar qualifications, at these or higher or lower salaries, will be filled from this examination. Certification to fill the higher-salaried positions will be made from those attaining the highest average percentages in the examination. In addition to the entrance salary, appointees whose services are satisfactory may be allowed the temporary increase granted by Congress of $240 a year. The duties of appointees will consist of making surveys of bridge sites, the design and preparation of plans for highway bridges, the superintendence of their construction, and their inspection. Competitors will be examined in the following subjects, which will have the relative weights indicated: (1) Practical questions in highway bridge engineering, 60; (2) education, experience, and fitness, 40. Applicants must have had at least four years of preliminary engineering experience; the successful completion of each year of an engineering course in a college or university of recognized standing being accepted as equivalent to one year of such experience. Applicants must have reached their twentieth but not their thirtieth birthday on the date of the examination. Applicants should at once apply for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington, D. C.

### Engineer, $3,000 or Over a Year. Assistant Engineer, $1,800-$2,880 a Year.

Vacancies in the Reclamation Service at the salaries indicated. and in positions requiring similar qualifications, at these or higher or lower salaries, will be filled from these examinations. The entrance salary within the range stated for these positions will depend upon the qualifications of the appointee and the duty to which he is assigned. Competitors will not be required to report for examination at any place, but will be rated on the subjects indicated below, which will have the relative weights stated: (1) Education, general experience, and fitness, 70; (2) thesis, specimens of work, or responsible experience in irrigation, drainage, land clearing, highway, agricultural, or sanitary engineering, 30.

*Engineer.*—The applicant must be a civil, mechanical, electrical, or other professional engineer or an architect; shall have been in active practice of his profession for ten years or more; shall have had responsible charge of engineering or architectural work for at least five years, and shall be qualified to design as well as to direct engineering or architectural work. Graduation from a school of engineering or architecture of recognized standing will be considered as equivalent to two years of active practice. Experience as a professor of engineering in a technical school of high grade will be considered as equivalent to an equal amount of actual practice.

Applicants must have reached their thirtieth but not their sixtieth birthday on the date of making oath to the application.

*Assistant Engineer.* — Applicants must have graduated from a standard high school or completed a course of study equivalent to that required for such graduation, and have had at least six years' practical experience in engineering. The completion of the second, third, and fourth years in a technical college of recognized standing will each be equivalent to one year of the required experience. A part of the experience must have been in a responsible capacity.

Under the second subject the applicant may submit (a) a thesis, not to exceed ten typewritten pages, comprising a technical description in detail of some important work upon which he has been engaged in a responsible engineering capacity; or (b) detailed plans, designs, or specifications prepared by himself or under his direction, for some work, accompanied by a statement as to the exact degree of his responsibility in connection with their preparation; or (c) a statement in full and in detail of his responsible experience in irrigation, drainage, land clearing, highway, agricultural, or sanitary engineering.

Applicants must be over twenty.

# Municipal Journal & Public Works.

City County State

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## PUBLIC MARKETS AND THE H. C. OF L.

An investigation in a suburb of New York a few days ago revealed the fact that the grocers there were charging from four to seven times as much for fresh vegetables as they paid to the farmers who brought them in.

The meat trust and the farmers are not the only food profiteers; in many cities the retailer adds more than all others combined. The public market affords a means of bringing him to terms, enabling the farmer to sell directly to the consumer; while the farmers can be prevented from combining to raise prices by the now familiar method of granting conditional licenses.

How several hundred public markets are run is discussed in this issue.

## STREET CLASSIFICATION AND TRAFFIC REGULATION.

There are many questions, like the one propounded by the grilled witness to the lawyer cross-examining him—"Have you stopped beating your wife yet?" which can not be answered satisfactorily by a plain "yes" or "no" without qualification. Such, we consider, are some of those that form the basis of the second article in this issue. There is no question that under certain conditions it is possible to classify city streets as to traffic and to satisfactorily pave them on the basis of such classification. The important point is the definition of the essential conditions and the securing of them in practice.

It would seem that the fundamental condition is that the traffic that uses the street shall be that for which the pavement was planned. It would also seem that this can be attained only by the use of a reasonable degree of wisdom in selection of thoroughfares and permanency of conditions in the areas served by each, and by traffic ordinances that are designed to confine the use of each street to that planned and are rigidly enforced.

In other words, city planning, including zoning of the city, must precede the selecting of the pavement best adapted for each thoroughfare, and the hearty co-operation of the ordinance-making body and of the police must be obtained and continuously retained to insure the confining of the heavier traffic to designated routes.

Given this intelligent co-ordination of the city planning, highway construction, and police functions of a city government, and it is undoubtedly practicable to designate specified streets for heavy, medium and light traffic, and pave them accordingly with a reasonable assurance that economy in paving can be secured without sacrificing durability. Unfortunately, there are few cities in which there is any regulation whatever of traffic as to routes followed, and a new pavement designed for light traffic, if paralleling a heavily-traveled street, is likely to receive a large part of the traffic which should use the latter street, and suffer rapid deterioration thereby. It is therefore unsafe, under present conditions, to place light pavements on any streets that can possibly be used as thoroughfares; although, even so, the taking of such chance in the majority of cases may prove economical, taking the city paving as a whole.

Millions of dollars are wasted every year because city planning and traffic regulation are not employed to aid in reducing to a reasonable minimum the cost of constructing and maintaining city pavements.

# MUNICIPAL MARKETS

## Open Markets in One Hundred and Sixteen Cities and Inclosed Markets in Fifty-six—Incomes and Expenses—Officials in Charge—Structures and Furnishings—Rental Charges—Products Sold.

The high cost of living has for some months received more attention from the people of the United States than probably any other subject, not excepting the peace treaty and the universal outbreak of the strike mania. A palliative that has been proposed and tried by more cities than almost any other is the eliminating of the profits of the middleman and even of the retailer by bringing producer and consumer into direct contact at public markets, either municipally or privately conducted.

In view of the general interest in the subject, the Census Bureau has collected statistics on the subject from the 227 cities which have a population of 30,000 or more, and these are used as the basis of this article. The figures and data in each case refer to the fiscal year ending between December 31, 1917 and November 30, 1918, the date varying with the different cities.

The public market is by no means a modern institution, but is really one of the oldest. Practically every city in Mexico and other tropical countries has its public market, and in this country such markets are more common in the southern than in the northern cities. New Orleans has 19 markets and Baltimore has 11, these being the two largest numbers reported. In the matter of age, however, Boston seems to lead, having erected a market in 1658; while its well-known Faneuil Hall was built in 1742, and although the original building was burned down, another on the same site and bearing the same name is still used as a market.

Perhaps the most pretentious market building in the United States is the West Side market of Cleveland, Ohio, shown in the illustration. This building and equipment cost $688,028 and the site cost over $210,000. This building is provided with a refrigerator plant and is devoted mainly to the sale of meats, dairy products and groceries, with small sections for fish and baked goods, while open sheds on one side and in the rear afford space for fruit and vegetable dealers.

The largest market is the Wallabout market in Brooklyn, New York, which covers about 35 acres, part of which is used as an open wholesale wagon market, the greater part of the remainder being leased to private parties, who have erected buildings at their own expense, the cost of these averaging about $2,200 each. These buildings cover about 310,000 square feet, and the open wagon markets about 166,500 square feet.

### PURPOSE OF MUNICIPAL MARKETS.

The purpose of a municipal market should be to assist in the economical distribution of foodstuffs. Where ornamentation of a market building is desired and this adds appreciably to its cost, the additional cost so caused should be regarded as a charge against the general revenue of the city and not against the market as such.

A municipal market should be self-supporting, but not a source of profit. The costs properly chargeable against its revenues are: (1) Expenses, or costs of maintenance and operation, (2) interest on debt incurred on its account, and (3) annual contributions to sinking fund accumulations for the amortization of long-term bonds, or annual appropriations for the payment of serial bonds maturing in fairly equal amounts from year to year.

A municipal market can justify itself only by supplying to its patrons some advantages not supplied by a privately owned public market. Both municipal and privately owned public markets afford opportunity for purchasing within a small space practically all of the articles required for the market basket. Therefore the rents and charges of the municipal market must be such as to attract sellers, and the location and conveniences attract buyers, in a greater degree than do privately owned markets.

In 1915 the massachusetts legislature passed an act authorizing all cities of over 10,000 inhabitants to maintain market buildings, and if they do not they are required to designate certain squares or streets to be used as public markets. In 1917 New York state passed a law whereby state aid is furnished to cities which may establish new markets or repair and improve existing ones; the state dividing with the city the net receipts in proportion to their respective expenditures.

The experience of cities with markets shows that much of the success with them depends upon the thoroughness of those charged with the publicity feature so essential in the inauguration and conduct of community activities and enterprises. Growers must be advised a number of months in advance, in order that they may make preparations for stocking the market when opened. Besides this, the producers should be assured that consumers will be informed of the opening of the market and of the opportunities of making purchases from time to time. If the market is to succeed, those in charge must so direct its activities that expectation of favorable conditions will be aroused in the minds of both producer or dealer and consumer or purchaser.

### FINANCES.

Of the 227 cities, 116 maintain open markets and 56 inclosed markets. (The term "inclosed" is applied to markets having inclosed buildings which are subdivided into stalls or booths for leasing to producers and dealers.) The total value of the market properties is $28,149,489, New York's share being the largest—$5,182,522, with Pittsburgh next with $3,095,457. Many of the cities reporting open markets report no value of properties, the markets being held on streets or public squares.

The annual payments for the fiscal year totalled $704,290 for expenses and $417,930 for outlays; Newark, N. J., leading in the former with $74,055, and Washington, D. C., in the latter with $123,398. Few cities under 50,000 inhabitants had expenses exceeding $3,000 or outlays exceeding $1,000. The receipts for the year totalled $1,735,178, or $612,958 more than the combined expenses and outlays, which would pay 2 per cent interest on the value of the market properties, or 8.8 per cent on the funded and floating debt on account of the markets; while the excess of receipts over expenses only would pay 3.7 per cent on the value of the market properties.

In most of the cities the receipts exceeded all payments, the former for New York being $312,845 and the payments $20,317; while for the smallest city on the list, Green Bay, Wis., the receipts were $586 and the payments $471. The expenses ranged all the way from $74,055 in the case of Newark, N. J., to nothing in several cities with only open markets.

The markets are in charge of a special "commissioner," "market master" or other official in most cities, but in some are looked after by a city official who has other duties as well. The highest salary paid to such officials is $7,500 paid by New York to the "commissioner of public markets." Most of the smaller cities pay from $100 to $800 (probably to officials who have other duties and salaries as well); $1,800 paid by Columbus, O., San Antonio, Tex., and Gary, Ind., being the largest paid by any except some of the twenty largest cities and Dayton, O.

### OFFICIALS IN CHARGE.

The official in charge is designated "commissioner" in New York and Toledo, O.; "supervisor" in Chicago and Elizabeth, N. J.; "market master" in Philadelphia, St. Louis, Cincinnati, Seattle, Kansas City, Mo., Portland, Oreg., Indianapolis, Denver, Rochester, St. Paul, Omaha, Spokane, New Haven, Memphis, Grand Rapids, San Antonio, Salt Lake City, Nashville, Houston, Springfield, Mass., Des Moines, St. Joseph, Mo., Fort Wayne and Evansville, Ind., Peoria, Ill., South Bend, Ind., Johnstown, Pa., Canton, O., Chattanooga, Covington, Tampa, Fla., Rockford, Ill., Gary, Ind., York, Pa., Lancaster, Pa., Huntington, W. Va., Lansing, Mich., Wheeling, W. Va., Lexington, Ky., Hamilton, O., Dubuque, Ia., Knoxville, Tenn., Elmira, N. Y., Cedar Rapids, Ia., Auburn and Jamestown, N. Y., Lima, O., Jackson, Mich., Aurora, Ill., and Joplin, Mo.; "superintendent" in Boston, Cleveland. Baltimore, Los Angeles, Buffalo, Milwaukee, Washington, D. C., Columbus, Dayton and Akron, O., Norfolk, Va., Troy, N. Y., Saginaw, Mich., Springfield, O., Lynchburg, Va., Council Bluffs, Ia., and Zanesville, O.; "clerk" in Detroit, Pittsburgh, Newark, N. J., Richmond, Va., Wilmington, Del., Savannah, Ga., Charleston, S. C., Roanoke and Portsmouth, Va., Williamsport and Norristown, Pa., and Wilmington, N. C.; "custodian" in Syracuse, N. Y.; "administrator" in Birmingham; "inspector" in Tacoma and Albany, N. Y.; "executive secretary" in Quincy, Mass.; while the highest paid or only market employe reported from New Orleans is called "engineer", from Duluth, Altoona, Pa., Niagara Falls, N. Y., Winston-Salem, N. C., and Tulsa, Okla., is a "janitor"; and Cambridge, Mass., Schenectady, N. Y., and Shreveport, La., report only laborers employed, and Wilkesbarre, Pa., a policeman.

### MARKET DAYS.

All cities other than Indianapolis larger than Dayton, O., keep some or all of their markets open every week day, and several of the smaller ones, suc has Wilmington, N. C., and Easton, Pa., do likewise; but a majority of the smaller cities keep them open only on Saturday and in addition either Tuesday and Thursday, or Wednesday. Cleveland keeps two markets open Tuesday, Thursday and Saturday, and one on Monday, Wednesday, Friday and Saturday. Eight cities open one or more markets on Sunday also. Some markets are open only a few hours in the morning, others throughout the day, and still others until noon and for a few hours in the late afternoon.

As a general thing, inclosed markets are open throughout the year. The open markets in thirty-one cities and one market in each of five others, however, were open during only part of the year. The opening and closing dates are probably fixed by custom rather than by city ordinances, in some cases at least. The majority of the markets that are not open throughout the year are continued from May or June until October, although three opened as early as March and four at late as August, while two remained open until September and seven until December. Weather and climate undoubtedly have considerable to do with the opening and closing dates.

In order that the public market should be most useful, its business should be intensive. If a half-day's business is spread over an entire day, the greater cost to the dealer is passed on to the consumer. This principle of economics should be recognized by the patrons of public markets and they should encourage the shortest market hours that are practicable. Another advantage in short hours is that many market products do not long retain their freshness, especially when exposed to the sun in the open market. Early marketing results in securing produce in good condition. Moreover, if the market gardener can be released from his duties as tradesman early in the day, he can use more of his time for production of food and thus reduce his expenses and the cost of food to him and thus enable him to reduce the price to the consumer.

WEST SIDE MARKET, CLEVELAND, OHIO.
Most pretentious market building in the country.

### STRUCTURES AND FURNISHINGS.

Thirty-three cities reported detached sheds used for markets, these containing raised platforms that varied in width from eight feet to forty feet, nearly half of those reported having the former width, while most of the larger ones varied from fourteen to twenty-two feet. The cost of these sheds varied from $210 for one of the sheds in Los Angeles to $100,000 for each of three sheds in New Orleans, the latter sum, however, including the cost of the land.

More than one-half of the market sheds were reported as constructed principally of steel, about one-third are of brick and wood, and the remainder are of other materials, including concrete. The largest detached shed area is reported for the Erie street market of Toledo, O., which covers an area of 94,500 square feet.

In one St. Louis market are two parallel sheds spaced eight feet in the clear between platforms, the intermediate space being paved with Telford. In one Baltimore market are four sheds with ten feet between columns, the intermediate spaces paved with asphalt. In one Washington market are three parallel sheds with sixty feet between their columns. In one Kansas City market are five parallel sheds with fifty feet between the central columns, the intermediate spaces being paved with concrete. In one Portland market are five parallel sheds spaced 26 feet from curb to curb of platform, with wood and asphalt paving between. In St. Paul are six parallel sheds spaced 50 feet from column to column, with brick paving between. In Salt Lake City there are three parallel sheds spaced 40 feet from curb to curb. In Saginaw, Mich., are two sheds spaced 60 feet between platforms, the intermediate spaces being paved with concrete.

Not all of the cities reported the equipment furnished to dealers in open markets, but twenty-one cities reported as follows: Wooden counters are furnished by Philadelphia in two markets, by Cleveland in two markets, by New Orleans in all markets, by Gary Ind., and by Tulsa, Okla.; while Portland, Ore., furdnishes folding wooden counters, Denver furnishes wooden benches, Tampa furnishes wooden tables or boxes, Lima, O., wooden stands, and Zanesville, O., wooden counters and tables. Other equipment furnished consists of iron pipe stands with wooden tops furnished at one Cleveland market; small benches and trays at all Los Angeles markets; metal counters under the shed, and metal knock-down counters and canvas awnings for stands on curb in Seattle. Salt Lake City furnishes portable stands three feet by seven feet; Tacoma furnishes knock-down counters and awnings; Cambridge, Mass., rough stands with cross braces for canvas covers; Springfield, Mass., tables six feet by three feet; Des Moines, iron and wooden stands two and a half feet by eight feet; Fort Wayne, counters three feet by six feet; Evansville, Ind., Bedford stone counters; Quincy, Mass., roughly constructed tables with cross braces for canvas covers, and Shreveport, La., furnishes portable shed and counter three feet by fifteen feet, including awning top.

In the inclosed markets most of the cities furnish such equipment as iron stands, counters, meat blocks, iceboxes, dial scales, tanks, tables, glass cases, slabs, lockers for storage, cages for poultry and racks for meat. Not all of these, however, are reported by many of the cities.

Ammonia refrigeration is furnished by nine municipal markets in as many cities, the cities being New York, Cleveland, Baltimore, Pittsburgh, Buffalo, New Orleans, Des Moines, Evansville and Lynchburg. In all of these brine is circulated to refrigerated counters, and in Baltimore, Buffalo, New Orleans and Des Moines brine is circulated through to refrigerated rooms also. All these cities except New Orleans report all of the refrigeration capacity used, New Orleans reporting only 50 per cent used. Baltimore and Cleveland leased refrigerated space to delears other than market tenants, while Cleveland furnishes such space to individuals who are not dealers. The capacity of the cold storage rooms and lockers in cubic feet and the cost of installing the refrigerating systems were reported by several cities as follows; New York, 32,000 cubic feet, $26,000; Cleveland, 132,000 cubic feet, $84,125; Baltimore, capacity not reported, $28,000; Pittsburgh, capacity not reported, $16,000; Buffalo, capacity 70,000 cubic feet, $14,000; New Orleans, 18,000 cubic feet, $10,000; Des Moines, 3,456 cubic feet, $8,000; Evansville, 5,284 cubic feet, $6,975; Lynchburg, 9,781 cubic feet, cost not reported.

*(To be continued)*

# STREET CLASSIFICATION AS AN AID TO PAVEMENT DESIGN

**Practicability of Such Classification—Relation Between Character and Density of Traffic and Thickness of Foundation—Opinions of a Number of Prominent Municipal Engineers.**

By JAMES W. ROUTH*

For several years there has been discussion among engineers of the effect of rapidly increasing motor traffic on pavements. The problem has been considered largely from the viewpoint of th state road rather than the city street, but it is no less important when viewed from the latter angle. Good roads are as necessary in cities as out of them. The use of motor vehicles so commonly by all classes of population makes necessary hard pavements on the majority of city streets. It is no longer enough to pave only the main thoroughfare.

This makes a new problem for the city administrator to solve. How can all the streets in the city be paved so as to serve their best purpose without shouldering a large burden of expense on the small property owner that formerly was thrust upon his wealthier neighbor?

It seems that perhaps a classification of streets according to use—character and density of traffic—may aid in achieving this end. Such a classification would make possible the use of heavy and expensive pavements on heavy traffic streets, and less expensive pavements on streets of lighter traffic. This thought led recently to the drafting of seven questions which were asked prominent municipal engineers. The nature of the questions and the replies received are considered of sufficient interest to warrant brief review. It should be noted that answers were received from city engineers, consulting engineers and engineering contractors of recognized standing in municipal work.

*Question No.* 1—Assuming a city having a population of 100,000 or more, is it possible to attempt to classify streets to be paved according to character and density of traffic?

Of 23 replies received, 20 answered this question in the affirmative. Of the 3 which answered in the negative, 1 qualified his answer by saying that it sometimes might be practical so to classify streets. Another negative answer was from an engineer who answered the entire list of questions in the negative.

*Question No.* 2.—Without reference to soil or subgrade conditions, should the thickness of concrete foundation under an asphalt wearing surface be varied according to such a classification?

There was some misunderstanding as to the meaning of this question, with the result that only 16 of the 23 engineers who answered it replied in the affirmative, 6 in the negative, and 1 frankly expressed his inability to answer. The difficulty seemed to lie in the failure to understand the first clause of the sentence which places out of consideration soil and subgrade conditions. The question was worded in this manner so as to determine if possible what effect on base thickness traffic alone is considered to have. It is recognized, of course, that in practical street construction, the condition of the subgrade and soil characteristics must be taken into full account, but it was felt that for the purpose in mind these factors should be left out of consideration.

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*Director, Rochester Bureau of Municipal Research.

*Question No.* 3.—Is it proper to assume that density of traffic (meaning frequently repeated heavy loads) will have a greater tendency to break down a pavement base than occasional heavy loads and normal light traffic?

To this question 19 affirmatives, 3 negatives, and 1 uncertain answers were received. Two of the negative answers were qualified so as practically to be affirmative.

*Question No.* 4.—About what proportion of pavement failures do you believe due primarily to failure of the foundation?

The majority of the engineers answering this question stated that from 60 per cent to 75 per cent of pavement failures, in their opinion, were due primarily to failure of foundation. Seven believed trench settlement to be the chief cause of pavment failures, others blamed lax construction methods, improper specifications or faulty inspection. A few engineers stated that they had no data on which to base judgment.

*Question No.* 5.—Would it be economically sound and according to good engineering judgment to require a 6-inch base in residential streets of light traffic and an 8-inch or 10-inch base in heavy-traffic main thoroughfares?

Sixteen affirmative and 3 negative answers were received. Four of those replying were unable to express an opinion. The main difference of opinion seemed to be as to the limiting thickness. Several engineers thought 6-inch too thick for the minimum and 10-inch too thick for the maximum. A 4-inch base for light traffic streets and an 8-inch base for heavy traffic streets, with the use of reinforcement over trenches, were among the suggestions made.

*Question No.* 6.—Is it proper to assume that the character of traffic borne by any street is susceptible of such rapid change as to make unwise the use of any but the heaviest foundation construction?

Sixteen affirmative and 3 negative answers were received. Three engineers expressed no opinion, and one a qualified affirmative. The general opinion seemed to be that the few cases in which the character of traffic might change would not warrant the expense of making all foundations of the heaviest type. One comment was to the effect that the interest on the excess cost of constructing heavy bases in all streets would pay for the few replacements made necessary because of mistaken judgment as to traffic changes.

*Question No.* 7.—Do you consider the following a good classification and a proper designation of base thickness:

Class A—Main heavy traffic thoroughfares, 10" base.

Class B—Intermediate thoroughfares, 8" base.

Class C—Major residential streets, 6" base.

Class D—Minor residential streets, 5" or 6" base (5" base with brick—6" base with asphalt. Where stone-filled sheet asphalt is used, binder course to be omitted with 6" base)?

About half of the answers to this question were qualified. Six were not in favor of the classification, four thought an 8-inch base sufficient for Class A streets, and others doubted the need for separating Class C and Class D streets. It is believed, however, that a classification of this kind is so largely a matter dependent upon local conditions that it would have to be decided upon for each locality without much regard to practice elsewhere. In the main, the general opinion of those engineers who replied to the question was that the classification with minor changes was satisfactory.

**Tabulation of Replies.**

| Question No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Affirmative | 20 | 16 | 19 | (a)16 | 17b | 14c | |
| Negative | 3 | 6 | 3 | (a) 3 | 3 | 7b | |
| No opinion | | 1 | 1 | 5 | 4 | 3 | 2 |

(a) 10—more than 50% caused by failure of foundation
7—comparatively few caused by failure of foundation
(b) 1 reply qualified
(c) 11 suggest minor changes in limiting base thickness.

## CONCLUSION.

This expression of opinion by engineers actively engaged in pavement design and construction, provides food for thought. For the most part, it seems to be recognized that a classification of streets is not only practical but economically necessary if a city's street system is to be developed for maximum utilization at minimum cost. The conclusion that comes from reviewing the replies received (and all who answered were generous in explaining and discussing the basis of their opinions) is that scientific pavement design is yet in its infancy. Data are lacking on which to base judgment as to the economic factors involved. Experiments such as are being conducted by the Office of Public Roads to determine the relation between load weight, soil condition, and base thickness, are being watched with interest. More experimental work of similar nature is needed. City engineers, and others in a position to do so, should study carefully and record their observations of the kind of service given by pavements under varying conditions of design and use.

The practical unanimity of opinion as to the desirability of a "use" classification for streets leads us to another conclusion. May not the zoning of cities that is being undertaken by so many city planning agencies prove useful to the pavement engineer? It seems that "use" zones for building may readily make possible "use" classification of streets. It is not necessary to make traffic surveys when character of traffic may be known from study of a zoning plat, and when density of traffic may be anticipated by studying the street layout in connection with such a plat. City planning and pavement design should go hand in hand. Best utilization of effective street layout can be accomplished only by the adoption of a farsighted paving policy and program, together with the city plan.

## ELECTRIC TRUCKS FOR REFUSE COLLECTION

J. A. Priestly, cleansing superintendent of Sheffield, England, has prepared an improved scheme for collecting and disposing of house refuse, which will require four additional motor vehicles or 12 horses and wagons. According to the London Electrician, he states that the experience of the past four years with electric vehicles has been eminently satisfactory, and has demonstrated that the work can be done by their agency more expeditiously and economically than by horse labor. For house-to-house collection work the electric vehicle cannot be approached by gasoline motors. Steam wagons approach more nearly to the electrics in suitability and economy, but the latter possess advantages in noiselessness and ease of maneuvering that are not shared by steam wagons, and require also the services of one man only to drive them, and that not necessarily a skilled man.

The total weight of refuse collected in the city during the past year was 110,855 tons, an average of 2,131 tons per week; but, as the amount varies as between summer and winter, the maximum amount to be collected during the heaviest period of the year is about 2,600 tons weekly. To collect this quantity of refuse by electric vehicles will require about 60 electrics, or, allowing a 10 per cent margin to cover breakdowns, 66 vehicles would be necessary. The city has at present 12 vehicles in use and three on order, and the full program would therefore require the provision of 51 additional machines. For charging the batteries of this number of vehicles, three 100-kw. motor-generators would be required, in addition to present charging facilities, and, as a stand-by machine is imperative, four generators of this capacity should be provided. Charging panels, switchboard, measuring instruments, etc., would also be required in proportion to the vehicles, and the total cost of the equipment would be about $500,000.

## CARD INDEX OF FIRE HOSE.

The Columbus, Ohio, Fire Department has for two years been keeping a record of each piece of hose put into service, using a card index for this purpose. Each length of hose is given a number and a card is made out for it. When hose is placed in the wagon, the number of each length is noted by the officer in charge of the station. Each time a wagon returns from a fire, the officer makes a note on their respective cards of the lengths of hose that were laid out and whether or not water was pumped through them. Hose used in the outlying districts is not subjected to so great wear and tear as that used in the congested districts, and therefore lasts longer. By comparing actual service rendered, the fire officials can get a line on the relative merits of the different types and makes of hose as regards life under service conditions.

## STANDARD HIGHWAY TRAFFIC REGULATIONS.

### Proposed by Highways Transport Committee for Adoption by Cities and Other Political Units Throughout the Country.

An attempt is being made by the Council of National Defense to secure the universal adoption and observance of traffic regulations adopted by it. Tens of thousands of copies of the regulations are being sent out by it as part of a campaign of education; for general familiarity with the regulations is considered even more important than police enforcement of them. Says William P. Eno, who is chiefly responsible for preparing them: "In the scientific regulation of traffic the first and most important step is the education of those to be regulated. If this principle is followed, the work of the police will be that of prompters and assistants of the individual rather than that of enforcers of the regulations. Drivers and pedestrians, once they know their rights, will themselves become the real regulators, as they will resent infraction by those few—a constantly diminishing number—wishing to override the rights of others."

It is proposed that these regulations be adopted by towns, cities and states throughout the country, and copies be circulated therein, both in the form of small pocket-size folders and as large placards for posting in garages, schools, station houses and other public buildings. It is recommended that the four-page folders be 4 by 6 inches, and the placards about 14 by 20 inches, and that light yellow paper with a smooth surface, which does not tear easily, be used. The Highways Transport Committee is trying to arrange, either with the Government Printing Office or with the printer who has done the work so far, to furnish the plates for the folders to any town, city or state at a reasonable price. In this way the expense and trouble of typesetting can be avoided and the printing done locally, insuring uniformity in appearance as well as standardization in wording.

The regulations are as follows:

## GENERAL HIGHWAY TRAFFIC REGULATIONS

### WITH DIRECTIONS FOR DRIVERS AND PEDESTRIANS

**Compiled for Standardization and Adopted by the**
**Highways Transport Committee of**
**THE COUNCIL OF NATIONAL DEFENSE, U. S. A.**
**May 8, 1919**
**Issued by the**
**[Space left for name of Town, City or State]**

### DEFINITIONS.

*"Highway"—any Street or Road used as a public thoroughfare.*

*"Roadway"—that part of a highway for the use of vehicles.*

*"Sidewalks"—that part of a highway or park for the use of pedestrians.*

*"Crosswalk"—that part of a roadway, marked or understood, upon which pedestrians should cross.*

*"Safety Zone"—that part of a roadway from which vehicles, unless confined to rails, are excluded.*

*"Curb"—the edge of a roadway, marked or understood.*

*"Limit Lines"—boundaries of ranking or parking areas, safety or danger zones, crosswalks, etc.*

*"Vehicle"—any conveyance, including a horse. Hand or foot propelled conveyances and skaters are regarded as vehicles when on a roadway but as pedestrians when on a sidewalk or crossing a roadway on a crosswalk.*

*"Street (Railway) Car"—any public service vehicle confined to rails on roadway.*

*"Horse"—any saddle or harness animal.*

*"Driver"—any person in control of a vehicle.*

*"One-Way Traffic"—traffic restricted to one direction.*

*"Ranking"—standing vehicles behind one another parallel with curb.*

*"Parking"—standing vehicles alongside one another at an angle to curb.*

**PEDESTRIANS MUST AVOID CARELESS WALKING AND ESPECIALLY OBSERVE THE FOLLOWING DIRECTIONS TO INSURE SAFETY AND AVOID UNNECESSARY INTERFERENCE WITH ONE ANOTHER AS WELL AS WITH VEHICLES.**

1. **Keep to the right on sidewalk, crosswalk, roadway and passageway (but in highway without sidewalk, keep to left, so as to have clear view of approaching traffic).**
2. **Observe traffic before stepping from curb and keep off roadway except when crossing.**
3. **Cross roadway at a right angle (never diagonally) and if reasonably possible on a crosswalk.**
4. **Watch for traffic officer's signal and heed traffic signs and limit lines.**
5. **Stand on sidewalk or within safety zone while waiting for a street car or bus.**
6. **Face and step towards front of street car when alighting.**
7. **When necessary to pass behind a street car watch out for traffic.**
8. **On alighting from a street car or other vehicle, observe traffic before moving.**
9. **Enter and leave a car-stop safety zone at crosswalk only.**
10. **Do not stand in the middle of a sidewalk but on one side and out of the way of other persons.**
11. **Do not loiter on a crosswalk or before a public entrance.**
12. **When sidewalks are narrow use the one on the right.**
13. **Do not walk more than two abreast on a crosswalk or congested sidewalk, nor more than three abreast on any part of any highway.**
14. **Hand or foot propelled conveyances and skaters must observe regulations for VEHICLES when on roadway, but directions for PEDESTRIANS when on sidewalk or crossing on crosswalks.**

**The following Regulations for vehicles (including street cars in so far as their being on rails will permit) shall be observed by the drivers thereof, who shall promptly comply with all orders by voice, hand or whistle from the police as to starting, stopping, slowing, approaching or departing from any place, the manner of taking up or setting down passengers and the loading or unloading of anything.**

**Vehicular or pedestrian traffic may be diverted by the police to avoid congestion or to promote safety and convenience.**

### ARTICLE I. RECKLESS DRIVING IS UNLAWFUL AND INCLUDES:

SECTION 1. Driving any vehicle when not legally qualified to do so, or when intoxicated, or when for any other reason not competent to drive properly.

SEC. 2. Driving any vehicle when it is not under practical control, **especially at crosswalks and roadway intersection or junctions.**

SEC. 3. Failing to exercise due care in crossing or entering the traffic of another roadway—**bearing in mind that it is obligatory not to interrupt the traffic of the more important thoroughfare unnecessarily.**

SEC. 4. Driving any vehicle across or into a safety zone.

SEC. 5. Exceeding a reasonable, considerate and safe speed rate under existing conditions or the speed rate established by law.

SEC. 6. Violating any of the following Regulations so as to cause danger or failing to take every reasonable precaution for safety or to obey any order of a traffic officer or any direction indicated by official traffic sign or limit line.

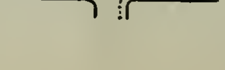
### ARTICLE II. PASSING, TURNING, AND KEEPING NEAR CURB.

SECTION 1. A vehicle passing or being passed by another shall not occupy more than its fair share of the roadway.

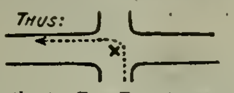
SEC. 2. A vehicle meeting another shall pass to the right.

SEC. 3. A vehicle overtaking another shall pass to the left, but must not interfere with traffic from the opposite direction, nor pull over to the right before entirely clear of the overtaken vehicle—**but in overtaking a street car, pass to the right if clearway permits.**

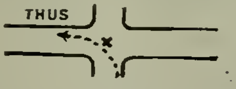
SEC. 4. A vehicle turning into a roadway to the right shall keep close to the right-hand curb.



SEC. 5. A vehicle turning into a roadway to the left shall pass around the central point of intersection of the two roadways,



except when directed by the traffic officer to pass in front of the central point of intersection,



and except when its turning radius will not permit passing around the central point of intersection without backing, **provided the vehicle slows down or stops and signals effectively.**

SEC. 6. A vehicle shall keep as near as practicable to the right-hand curb—**the slower the speed the nearer the curb.**

SEC. 7. A vehicle cruising for fares shall proceed fast enough not to impede following traffic.

SEC. 8. A vehicle on a roadway divided longitudinally by a parkway, walk, sunkenway, viaduct, safety zone, or cab stand, shall keep to the right of such division.

SEC. 9. A vehicle passing around a circle, oval or other form of centralized obstruction, shall keep to the right of such obstruction.

### ARTICLE III. STOPPING, RANKING OR PARKING, WAITING, OBSTRUCTING, TRAFFIC, BACKING AND FOLLOWING.

SECTION 1. A vehicle shall stop near the right-hand curb only, except on a one-way traffic roadway, where it may stop at either curb if the roadway is wide enough for three vehicles abreast. **This rule shall not apply to a designated ranking or parking space.**

SEC. 2. A vehicle shall not stop on a crosswalk nor within a roadway intersection except in an emergency.

SEC. 3. A street car shall not stop within five (5) feet of a street car ahead.

SEC. 4. A vehicle shall neither rank nor park so as to prevent the free passage of other vehicles in both directions at the same time; nor in one direction on a "one-way traffic" roadway; nor with any part of it or of its load extending beyond limit lines; nor within ten (10) feet of a fire hydrant.

SEC. 5. A vehicle waiting in front of an entrance to a building or a transportation station shall promptly give place to an arriving vehicle.

SEC. 6. A vehicle, when another vehicle is waiting to take its place, shall not remain in front of the entrance to a building or transportation station, except while expeditiously loading or unloading, and, if horse-drawn and with four wheels, the horse shall stand parallel with the curb, faced in the direction of traffic.

SEC. 7. A vehicle shall not occupy a roadway so as to obstruct traffic.

SEC. 8. A vehicle shall not back to make a turn if doing so will obstruct traffic but shall go to a place with clearway enough for the purpose.

SEC. 9. A vehicle shall not follow another too closely for safety.

### ARTICLE IV. OVERTAKING STREET CARS.

**(Where No Car-Stop-Safety-Zone or Platform Is Provided)**

A vehicle overtaking a street car, stopped to take up or set down passengers, shall stop or pass very slowly, carefully and considerately, not approaching said car nearer than eight (8) feet in any direction.

### ARTICLE V. RIGHT OF WAY.

SECTION 1. A vehicle shall facilitate the right-of-way of Police Department and Emergency Repair vehicles of Public Service Corporations and Ambulances when in performance of duty, **but this shall not relieve such vehicles from consequences of carelessness.**

SEC. 2. A vehicle, on the approach of fire apparatus, shall move out of its way or stop so as not to interfere with its passage.

SEC. 3. A vehicle in front of a street car, upon signal, shall immediately get off the track.

### ARTICLE VI. SIGNALS.

SECTION 1. Drivers, to prevent accidents, must observe traffic, exercise caution and signal by hand or by some other effective method before slowing, stopping or backing; and, before turning, **especially to the left,** must indicate direction of the turn by the signal.

SEC. 2. Drivers when approaching or entering a curve or highway intersection or junction or coming to the top of a hill, **if roadway is obscured,** must use sound signal effectively and go slow.

SEC. 3. Drivers when crossing a crosswalk must go slow, take care, and signal when necessary to insure safety.

SEC. 4. Police whistle signals indicate by—

**One Blast**—that approaching traffic shall stop behind crosswalks;

**Two Blasts**—that halted traffic shall proceed;

**Three or more Blasts**—approach of fire apparatus or other danger.

SEC. 5. Vehicles must be equipped with lights and sound signals as prescribed by law, but sound signals shall not be used except for necessary traffic warning. **A moderate speed will reduce need for noisy signals.**

### ARTICLE VII. RESTRICTIONS IN REGARD TO VEHICLES.

SECTION 1. A vehicle shall not be used when it is so constructed, enclosed, equipped or loaded as to be dangerous, to scatter its contents, retard traffic, or prevent the driver from having a view sufficient for safety; or when it is so loaded with iron or other material as to create loud noises while in transit, or when it is loaded with any material extending beyond its rear without being provided with a red flag by day and a red light at night on the rear end of the load.

SEC. 2. A vehicle unless confined to rails shall not tow more than one other vehicle and no tow connection shall be more than sixteen feet in length, without authorization by law or official permit.

SEC. 3. A motor vehicle left standing, without driver in charge, shall not be in such a condition as to prevent its being rolled out of the way in case of emergency, but it shall have its motor stopped and effectively secured against being started, its emergency brake set, and, if on a hill, its front wheels turned in the direction of the curb.

SEC. 4. A vehicle intended for commercial purposes shall not be driven by anyone less than sixteen years of age.

SEC. 5. No one shall ride upon or hold on to the rear of a vehicle without the driver's consent.

SEC. 6. Coasting is prohibited where dangerous.

SEC. 7. Opening a motor muffler cut-out on a highway within a city or village, or within 500 feet of a dwelling, school, church or hospital is prohibited.

SEC. 8. Dense smoke from motors is prohibited.

### ARTICLE VIII. CONTROL, TREATMENT AND CONDITION OF HORSES.

SECTION 1. A horse shall not be unbridled nor left unattended in a highway or unenclosed area, without being safely fastened, unless harnessed to a vehicle with wheels so secured as to prevent the horse from moving faster than a walk.

SEC. 2. No one shall ride, drive or lead a horse on a slippery pavement, unless the horse is properly shod to prevent falling; over-load, over-drive, over-ride, ill-treat or unnecessarily whip any horse; crack or so use a whip as to excite any other one's horse, or so as to annoy, interfere with or endanger any person; or use a horse unless fit for its work, free from lameness or sores likely to cause pain, and without any vice or disease likely to cause accident, injury or infection.

SEC. 3. A led or ridden horse should be approached slowly and with extra care and consideration, particularly by motor vehicles.

Sufficient quantities of the four-page folders should be kept always at hand at all police stations, to be had on application; and every driver, before receiving a license, should be required to pass an examination on them and to carry a copy of them with him wherever operating a car. Police should have copies with them and give each infractor a copy, marking the section which he has violated.

School children should be required to study the regulations, for their value is perhaps 95 per cent for education and only 5 per cent for enforcement, and the work required of the traffic police is in inverse proportion to the education of the public.

If any change whatever is made in these regulations by any city or organization, they can not be considered as standard. If any one should think changes advisable, however, they are invited to send criticisms or suggestions to the Highways Transport Committee of the Council of National Defense, Washington, D. C., and they will be considered.

Special stress is laid on the necessity for caution at crossings, roadway intersections, and junctions, where most of the accidents happen. This caution involves extreme care on the part of drivers and constant watchfulness on the part of both drivers and pedestrians. Observance of this one feature of the regulation doubtlessly would eliminate the majority of traffic accidents.

# ELECTROLYTIC SEWAGE TREATMENT.*

## Investigation of Easton Plant by Committee of Franklin Institute—Chemical and Bacterial Effect of Treatment—Cost of Treatment.

The changes brought about in the raw sewage by the plant are compared in the accompanying table:

| | Lime and Electricity | | Lime alone | | Electricity alone | |
|---|---|---|---|---|---|---|
| | P.P.M. | % | P.P.M. | % | P.P.M. | % |
| Chlorine ........ | + 1.2 | + 1.9 | +12.3 | +18.2 | +1.6 | + 2.2 |
| Nitrite ......... | + 0.014 | +58.3 | – 0.005 | –10.0 | –0.01 | –20.0 |
| Nitrate ......... | + 0.13 | +23.6 | + 0.005 | + 0.8 | –0.15 | –20.0 |
| Free ammonia... | – 3.3 | –18.3 | + 0.2 | + 1.3 | +0.9 | + 6.6 |
| Album. $NH_3$..... | – 3.6 | –12.1 | – 0.4 | – 1.7 | –0.5 | – 2.3 |
| Required oxygen | –13.0 | –20.5 | – 7.7 | – 8.9 | –6.5 | –10.0 |
| Dissolved $O_2$..... | + 1.78 | +40.9 | – 0.93 | –19.1 | +1.61 | +40.1 |
| Dissolved, sewage | 4.17 | 95.9 | 4.85 | 99.4 | 3.93 | 98.0 |
| $O_2$ absorbed in 5 days, effluent.. | 0.77* | 12.6 | 3.82 | 96.7 | 5.17 | 92.0 |
| Bacteria Reduction | | | | | | |
| Total count at 37° C., per c. c... | –343,200 | –92.7 | – 373,000 | –82.4 | –165,000 | –37.8 |
| Total count at 20° C., per c. c... | –688,000 | –92.2 | –1,074,000 | –90.1 | –635,000 | –70.0 |
| B. coli at 37° C., per c. c........ | – 77,880 | –99.85 | – 96,300 | –92.3 | –45,000 | –81.8 |

From a comparison of the results recorded in this table, it will be observed that with electrolytic-lime treatment the quantities of nitrite and nitrate in the sewage are increased, while with lime alone and with electricity alone a material decrease or but a slight increase is effected. With the electrolytic-lime treatment there is a marked decrease in free ammonia and albuminoid ammonia, whereas with the lime or with the electrical treatment there is a small decrease in albuminoid ammonia, and an increase in free ammonia. The required oxygen is decreased by all three treatments, but that effected by the electrolytic-lime treatment is approximately double that brought about by either of the other methods. Due to the production of oxygen by the electric current, an increase in dissolved oxygen of about 40 per cent is effected by the electrolytic-lime treatment and by the purely electrical treatment; while with lime alone a decrease of 19 per cent in dissolved oxygen occurs.

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*Concluded from page 132.

The amount of the dissolved oxygen absorbed by the effluent in five days at a temperature of 10° C. to 15° C. affords very important information regarding the efficiency of the three methods of treatment. Indeed this test is regarded by many authorities as one of the most important standards for determining the purity of an effluent. The results recorded in the table show that while practically all of the dissolved oxygen in the raw sewage is absorbed during the five-day period, that in the effluent produced by the electrolytic-lime treatment is reduced only 0.77 part per million, or 12.6 per cent, a figure which lies far below the limit allowed by the Royal Sewage Commission. On the other hand, nearly all of the dissolved oxygen in the effluents produced by the lime treatment and by the electrical treatment is absorbed in the five-day period, showing that by these methods the unstable organic matter in the sewage was but partially oxidized.

It will be observed that electrolytic-lime treatment brings about a reduction of over 92 per cent in the total bacteria count, while the lime treatment effects a reduction of 82 per cent at 37° C. and 90 per cent at 20° C., and the electrical treatment produces a reduction of only 38 per cent at the higher temperature and 70 per cent at the lower temperature. The reduction in B. coli per c.c. amounts to 99.85 per cent with the electrolytic-lime treatment, and to 92.3 per cent and 81.8 per cent, respectively, with the lime treatment and with the electrical treatment.

It may be of interest to mention that the effluents produced by the different treatments were examined after having been kept in the stoppered bottles for five weeks. Those obtained in runs 1 to 8 (electrolytic-lime treatment) had little or no odor; that obtained in run 9 (lime treatment only) had a very disagreeable odor, while that obtained in run 10 (electrical treatment only) smelled strongly of hydrogen sulphide, and had turned black owing to the conversion of the iron dissolved from the electrodes into iron sulphide.

The authors of the report found it extremely difficult to compare the cost of treatment by this process with the cost by others in common use, either of construction or of operation, conditions vary so in different cities. Such calculation should take into account the cost of a site that is sufficiently remote to avoid offense, at a low elevation to eliminate or minimize pumping, and reasonably close to a stream furnishing a proper outlet. The outlet trunk sewer, sometimes long and expensive, should be considered in its effect on total cost, and the relative costs of leading the sewage to one central plant or treating it at several small ones.

In the electrolytic process there are eliminated a number of the units required in ordinary treatment systems, but on the other hand, a protective building is necessary, and skilled labor must be continuously employed to operate it. Where a direct oxidation plant can be combined with an electric lighting plant or a pumping station, the cost of both protective building and operation can be reduced. "When this cannot be done, the Landreth direct oxidation process is not in our judgment economical if the population tributary to the plant is very small."

But, as the plant can be located in a densely populated section, "an inexpensive property of a few thousand square feet conveniently situated near outlets of main sewers is all that is required for this electrolytic process, compared with the large areas at a distant point demanded by ordinary methods of sewage disposal."

The cost of operating a two million gallon plant and a ten million gallon are estimated by the authors as follows:

**Comparison of Cost of Operation Between 2,000,000-Gallon Plant and 10,000,000-Gallon Plant.**

Capacity ............ 2,000,000 gallons per day
Population........... 20,000

The operation cost is based upon the following daily items:

| | |
|---|---|
| 1,600 lbs. 90 per cent lime per day at $6 per ton.. | $5.33 |
| Current, 282 kw. hrs. per day at 2 cents.......... | 5.64 |
| Heat and light per day.......................... | 2.00 |
| Renewals ....................................... | 2.00 |
| Maintenance and repairs......................... | 1.00 |
| Labor: | |
| 3 men—8 hr. shifts, at $5, $4, $4. | |
| 1 laborer at $3................................. | 16.00 |
| Total .......................................... | $31.97 |

This is 58 cents per capita per year for operation, of which about 51 per cent is for labor alone.

Capacity .......... 10,000,000 gallons per day
Population.......... 100,000

The operation cost is based upon the following daily items:

| | |
|---|---|
| 8,000 lbs. 90 per cent lime per day at $6 per ton.. | $26.75 |
| Current, 1,410 kw. hrs. per day at 2 cents........ | 28 00 |
| Heat and light per day (estimated)............ | 2.00 |
| Renewals ..................................... | 10.00 |
| Maintenance and repairs....................... | 6.00 |
| Labor: | |
| 1 superintendent.............................. | 5.00 |
| 3 operators at $4............................. | 12.00 |
| 1 laborer..................................... | 3.00 |
| Total ........................................ | $92.75 |

This is 34 cents per capita per year for operation, of which about 22 per cent is for labor.

A comparison of cost of construction is made with a number of other plants, including the following: Gloversville, N. Y., sedimentation tanks and filters, $15.26 per capita. Fitchburg, Mass., Imhoff tanks, etc., $12.88 per capita. Worcester, Mass., Chemical precipitation and sand filters, $9.31 per capita. Clinton, Mass., sand filters and pumping station, $7.96. York, Pa., outfall sewer and sand filters, $6.48 per capita. Typical plant, Imhoff tank and trickling filter (H. P. Eddy), $7.85. Typical plant, activated sludge (H. P. Eddy), $5.71. Electrolytic plant, $3.99. (The last three are calculated for a population of 55,000.) "It has not been possible to indicate in every case the actual cost of the disposal plant alone, eliminating property values, trunk lines costs, etc., and on that account the per capita costs show such great variations. It is evident, however, that the per capita cost of the construction of a direct oxidation plant compares favorably with that of any other process."

The costs of operation, per capita of population for which plant was designed, were stated to be as follows: Gloversville, interest and depreciation, $1.16; operation $0.27. Fitchburg, $1.34 and $0.26; total, $1.60. Worcester, $0.79 and $0.37; total $1.16. Clinton, $0.73 and $0.57; total $1.30. York, $0.42 and $0.11; total, $0.53. Typical Imhoff plant, $0.51 and $0.31; total $0.82. Typical activated sludge plant, $0.37 and $0.73; total, $1.10. Electrolytic plant, $0.26 and $0.38; total $0.64. These figures "indicate the actual cost of operation per capita of a number of sewage disposal plants in the United States with the additional costs for interest and depreciation. An examination of this table indicates that the economy resulting from the use of the direct oxidation process is effected largely through a saving in the cost of construction.

"In the operation of this electrolytic process it is imperative to have skilled labor in constant attendance, although the duties imposed upon it are light. However, in this process the number of units can be largely increased without any appreciable increase in the amount of labor necessary to operate the enlarged plant. This is illustrated by the data contained in the table showing comparisons between the operating costs of 2,000,000-gallon and 10,000,000-gallon plants."

# METERS

## Data Supplementary to Those Published in the June 7th Issue—Number, Reading and Billing in the Different Cities.

| City and State— | Number in use | Number under 1 inch | Frequency of reading each meter | Billing, simultaneous or in rotation | Average number of meters read per hour per man. | Meters in building or outside. | Cost of meter reading and clerical work on meter accounts. |
|---|---|---|---|---|---|---|---|
| **Alabama:** | | | | | | | |
| Mobile | 7,296 | ..... | Monthly | Simultaneous | .... | Outside | ........ |
| **Arkansas:** | | | | | | | |
| Jonesboro | 376 | 365 | Monthly | Simultaneous | 15 | Mostly outside | ........ |
| **California:** | | | | | | | |
| Eureka | 2,772 | 2,700 | Monthly | Simultaneous | 55 | Outside | $.047 per meter per month |
| Ontario | 1,776 | ..... | Monthly | Simultaneous | 50 | .... | $.019 per meter per month |
| Pacific Grover and 4 other municipalities | 3,280 | 3,189 | Monthly | Rotation | 40 | Outside | ........ |
| Pomona | 2,963 | 2,893 | Monthly | Simultaneous | 30 to 40 | Outside | ........ |
| San Francisco | 71,966 | 69,282 | Monthly | Rotation | 50 | Mostly outside | ........ |
| Santa Rosa | 2,200 | All but 1 or 2 | Monthly | Simultaneous | .... | Outside | $86 per month |
| **Colorado:** | | | | | | | |
| Longmont | 110 | 88 | Monthly | Simultaneous | .... | Both | ........ |
| **Connecticut:** | | | | | | | |
| Bristol | 2,493 | 2,447 | Quarterly | By districts | 10 | Mostly inside | $43 per week |
| New Britain | 5,494 | 5,124 | Monthly | Simultaneous | 17 | Inside | $75 per week |
| New London | 4,100 | 3,775 | Monthly | Simultaneous | 16 | Mostly inside | ........ |
| Windsor | 51 | 39 | Quarterly | Simultaneous | 18 | Both | ........ |
| **Florida:** | | | | | | | |
| Daytona | 825 | 800 | Quarterly | Simultaneous | 25 | Mostly outside | ........ |
| Orlando | 250 | 205 | Quarterly | Simultaneous | .... | Outside | ........ |
| **Idaho:** | | | | | | | |
| Boise | 4,586 | 4,422 | Monthly | Simultaneous | 40 | Mostly outside | About $80 |
| Weiser | 600 | 585 | Monthly | Simultaneous | 15 to 20 | Outside | ........ |
| **Illinois:** | | | | | | | |
| Elgin | 5,514 | 5,389 | Quarterly | 3 districts | 19 | Mostly inside | ........ |
| Freeport | 3,934 | 3,828 | Monthly | Simultaneous | 18 to 20 | 95% inside | ........ |
| Kankakee | 700 | 685 | Monthly | Rotation | 10 | Both | ........ |
| Rock Island | 2,400 | 2,000 | Quarterly | Simultaneous | 15 | Mostly inside | ........ |
| Springfield | 9,632 | 9,330 | 1,500 monthly, balance quarterly | Simultaneous | 20 | Mostly inside | $1.10 per year |
| **Indiana:** | | | | | | | |
| Batesville | 81 | 74 | Quarterly | Simultaneous | All in 1 day | Mostly inside | ........ |
| Elwood | 950 | 5 | Quarterly | Simultaneous | 20 | Both | ........ |
| Indianapolis | 5,577 | 4,819 | Monthly | Simultaneous | 15 | Mostly inside | ........ |
| Lafayette | 1,400 | 1,278 | Quarterly | Simultaneous | 50 to 75 per day | Both | ........ |
| Marion | 1,800 | 1,650 | Quarterly | Simultaneous | 12 or 15 | Both | ........ |
| New Albany | 390 | 75% | Monthly | Simultaneous | 8 | Both | $50c per meter per year |
| Richmond | 4,116 | 4,009 | Quarterly; large ones monthly | Simultaneous | .... | Mostly inside | ........ |
| Shelbyville | 450 | 445 | Monthly | Simultaneous | .... | Mostly inside | ........ |
| Union City | 1,175 | 1,150 | Quarterly | Simultaneous | 125‡ | Mostly inside | ........ |
| **Iowa:** | | | | | | | |
| Albia | 435 | 425 | Every 2 months | ........ | .... | Mostly inside | $40 per month |
| Council Bluffs | 7.000 | 6,900 | Weekly and bi-monthly | By districts | 15 | Mostly inside | 5.1c per meter |
| Creston | 1,050 | 1,034 | Quarterly and monthly | Simultaneous | 15 | Inside | ........ |
| Fairfield | 900 | 850 | Monthly | Simultaneous | 20 | Both | ........ |
| Iowa City | 2,300 | 2,220 | Monthly | Simultaneous | 15 to 20 | Mostly inside | $20 per month |
| Osage | 740 | 736 | Semi-annually | Simultaneous | 10 | Inside | ........ |
| Oskaloosa | 520 | ..... | Quarterly and monthly | Simultaneous | .... | Both | ........ |
| Stanton | 60 | 59 | Quarterly | Simultaneous | .... | Mostly inside | ........ |
| Vinton | 750 | 735 | 3 times a year | Simultaneous | .... | Mostly inside | ........ |
| **Kansas:** | | | | | | | |
| Newton | 2,275 | 2,238 | Quarterly and monthly | Simultaneous | .... | Outside | ........ |
| Olathe | 600 | 500 | Monthly | Simultaneous | .... | Both | ........ |
| Pittsburg | 1.721 | 1,715 | Monthly | By districts | 32 | Both | ........ |
| Topeka | 8,200 | 89% | Monthly | Rotation | 23 | Both | 10c per bill |
| Wellington | 1,451 | 1,430 | Monthly | Simultaneous | 25 | Mostly outside | ........ |
| **Kentucky:** | | | | | | | |
| Richmond | 100 | ..... | Monthly | ........ | .... | Outside | ........ |
| **Louisiana:** | | | | | | | |
| Alexandria | 2,500 | 90% | Quarterly and monthly | Simultaneous | 25 | Outside | $200 per month |
| Baton Rouge | 3,000 | 90% | Monthly | Rotation by districts | 30 | Outside | $380 per month |
| **Maine:** | | | | | | | |
| Calais | 155 | 150 | Monthly | Simultaneous | 5 to 7 | Mostly Inside | ........ |
| **Massachusetts:** | | | | | | | |
| Athol | 72 | None | Monthly | Simultaneous | .... | Inside | ........ |
| Brockton | 9.884 | 9,603 | Monthly; few large ones weekly | Rotation by districts | 15 or more | Mostly inside | 78c per meter per year |
| Framingham | 2,772 | 2,638 | Quarterly | Simultaneous | 15 | Both | $1,417.10, incl. labor repairs |
| Haverhill | 3,202 | 2,708 | Semi-annually and monthly | Simultaneous | .... | Mostly Inside | $2,500 |
| Medway | 260 | 250 | Semi-annually | Simultaneous | .... | Inside | ........ |

## METERS (Continued).

| City and State— | Number in use | Number under 1 inch | Frequency of reading each meter | Billing, simultaneous or in rotation | Average number of meters read per hour per man. | Meters in building or outside. | Cost of meter reading and clerical work on meter accounts. |
|---|---|---|---|---|---|---|---|
| **Massachusetts** (Continued). | | | | | | | |
| Milbury | 410 | 400 | Monthly | Simultaneous | 12 | Inside | Done by superintendent |
| Monson | 218 | 202 | Monthly | Simultaneous | .... | Inside | $10 per month |
| North Adams | 59 | 10 | Quarterly | Simultaneous | .... | Mostly inside | ........ |
| Oxford | 311 | 310 | Quarterly | Simultaneous | .... | Inside | ........ |
| Spencer | 850 | 835 | Quarterly | Simultaneous | 12 | Inside | Reading, $45 per quarter |
| Turners Fall | 46 | 28 | Semi-annually | Simultaneous | Two days to real all | 43 inside | ........ |
| Winchester | 2,300 | 2,100 | Semi-annually | Simultaneous | 16 | Inside | ........ |
| Winthrop | 2,960 | 2,940 | Quarterly and monthly | Simultaneous | 10 | Both | About $200 per month |
| **Michigan:** | | | | | | | |
| Ann Arbor | 500 | 90% | Monthly | Simultaneous | .... | Mostly inside | $65 monthly |
| Marquette | 1,300 | 1,250 | Quarterly | Simultaneous | 12 | Inside | Done by regular employes |
| Midland | None | .... | ........ | Simultaneous | .... | .... | ........ |
| Paw Paw | 450 | 445 | Semi-annually | Simultaneous | 40 | Both | ........ |
| **Minnesota:** | | | | | | | |
| Moorhead | 673 | 664 | Monthly | Simultaneous | .... | Inside | ........ |
| Willmar | 825 | 805 | Quarterly | Simultaneous | 20 | Inside | About 6c per meter |
| **Mississippi:** | | | | | | | |
| Tupelo | 625 | 620 | Quarterly | Simultaneous | 260 per day | Outside | $65 per month |
| **Missouri:** | | | | | | | |
| Fulton | 450 | 440 | Quarterly | Simultaneous | 20 | Both | ........ |
| Washington | 290 | 265 | Monthly | Simultaneous | One man reads all in 20 hours | 95% in cellars | ........ |
| **Montana:** | | | | | | | |
| Bozeman | 50 | 40 | Monthly | Simultaneous | 4 | Both | $12.50 per month |
| Deer Lodge | 3 | None | Monthly | Simultaneous | .... | 2 inside, 1 outside | ........ |
| Glendive | 690 | 674 | Monthly | Simultaneous | 14 | Inside | 9c per bill |
| **New Hampshire:** | | | | | | | |
| Dover | 1,602 | 1,580 | Quarterly | Simultaneous | .... | Inside | ........ |
| **New Jersey:** | | | | | | | |
| Dover | 1,350 | Nearly all | Quarterly | Simultaneous | 6 | Inside | ........ |
| Helmetta | 1 | .... | Daily | No billing; water free | .... | In filter room | ........ |
| **New Mexico:** | | | | | | | |
| Raton | 122 | 119 | Quarterly, except three | Simultaneous | 7.5 | 75% outside | $8.51 |
| **New York:** | | | | | | | |
| Amityville | 4 | .... | Semi-annually | Simultaneous | .... | Both | ........ |
| Binghamton | 10,198 | 9,979 | Every two and three months | Simultaneous | 15 | Inside | $.03 |
| Carthage | 400 | 365 | Monthly and semi-annually | Simultaneous | 20 | Mostly inside | ........ |
| Cortland | 2,500 | 2,300 | Quarterly | Simultaneous | 25 | Inside | About $200 per reading |
| Glens Falls | 53 | 23 | Quarterly | Simultaneous | .... | Both | ........ |
| Hempstead | 24 | 18 | Semi-annually | Simultaneous | All in three hours | Two-thirds inside | ........ |
| Homer | 130 | All | Semi-annually | Simultaneous | .... | Inside | Nothing |
| Hudson Falls | 80 | 60 | Quarterly | ........ | .... | Inside | ........ |
| Jamestown | 8,866 | 8,688 | Quarterly | Simultaneous | 100‡ | Both | ........ |
| Kingston | 200 | 125 | Monthly | Simultaneous | .... | Both | ........ |
| Oneonta | 75 | .... | Quarterly | Simultaneous | .... | Both | ........ |
| Oswego | 200 | 100 | Monthly | Simultaneous | 10 | Inside | ........ |
| Waterloo | 240 | 235 | Quarterly | Simultaneous | .... | Mostly inside | ........ |
| **North Carolina:** | | | | | | | |
| Durham | 2,175 | 2,075 | Quarterly; industrial, weekly | Simultaneous | 75‡ | Outside | ........ |
| Newbern | 150 | 106 | Monthly | Simultaneous | .... | Outside | ........ |
| Oxford | 435 | 425 | Monthly | Simultaneous | 2½ days by one man | Outside | $25 per month |
| Raleigh | 1,400 | 75% | Quarterly and monthly | Simultaneous | .... | Mostly outside | ........ |
| **North Dakota:** | | | | | | | |
| Mandan | 650 | 640 | Monthly | Simultaneous | 20 | Inside | $37 per month |
| Valley City | 625 | .... | Monthly | Simultaneous | .... | Inside | ........ |
| **Ohio** | | | | | | | |
| Barberton | 2,700 | 2,680 | Quarterly | Simultaneous | 15 | Inside | $207.50 per month |
| Defiance | 280 | 230 | Monthly | Simultaneous | 10 | Inside | Reading a little less than 3c |
| Middletown | 3,060 | 3,000 | Quarterly | Simultaneous | 30 | Inside | $150 per quarter |
| St. Marys | 800 | 2 | Semi-annually | Simultaneous | 8 | Both | 10c per meter; total, $86.50 |
| Toledo | 38,854 | 37,915 | About eight times a year | By districts | 15 to 20 | Inside | ........ |
| Wauseon | 800 | 750 | Every four months | Simultaneous | 15 | Both | 50c per hour for reading |
| **Oklahoma:** | | | | | | | |
| Tulsa | 8,500 | 6,000 | Monthly | By districts | 20 to 30 | Outside | 5c per meter per month |
| **Oregon:** | | | | | | | |
| La Grande | 1,600 | 1,500 | Monthly | Simultaneous | 15 | Mostly outside | ........ |
| **Pennsylvania:** | | | | | | | |
| Ford City | 800 | 793 | Monthly | Simultaneous | 15 | Both | 8c per meter |
| Ambler | .... | .... | Quarterly | Simultaneous | .... | 90% inside | ........ |
| Emporium | 20 | 15 | Quarterly | Simultaneous | .... | Both | ........ |
| Franklin | 90 | 65 | Quarterly | Simultaneous | 10 | Both | $25 |
| Gettysburg | 90 | .... | Quarterly | Simultaneous | .... | Both | ........ |
| Hanover | 125 | 80 | Monthly | Simultaneous | 15 | Mostly inside | ........ |
| Lansford | 436 | 426 | Quarterly | Simultaneous | 8 | Inside | 10c per meter per reading |
| Lehighton | 20 | 15 | Monthly | Simultaneous | 10 | Inside | 9c per meter per reading |
| Norristown | 800 | 700 | Quarterly | Simultaneous | 15 | Inside, except large meters | ........ |
| Oil City | 4,776 | 10 | Quarterly | Simultaneous | 20 | Inside, except 25 | ........ |

### METERS (Continued).

| City and State— | Number in use | Number under 1 inch | Frequency of reading each meter | Billing, simultaneous or in rotation | Average number of meters read per hour per man. | Meters in building or outside. | Cost of meter reading and clerical work on meter accounts. |
|---|---|---|---|---|---|---|---|
| **Pennsylvania** (Continued). | | | | | | | |
| Reading .......... | 9,790 | 9,057 | Quarterly and monthly | Rotation | .... | Mostly inside | 39.2c per meter |
| Wellsboro ........ | 51 | 37 | Quarterly | Simultaneous | .... | Both | ........ |
| Pottsville ........ | 300 | 200 | Monthly | Simultaneous | .... | Inside | ........ |
| **Rhode Island:** | | | | | | | |
| Providence ....... | 30,583 | 28,865 | Mostly quarterly | Simultaneous | 18 | Mostly inside | $267.85 per week |
| **South Dakota:** | | | | | | | |
| Mitchell .......... | 925 | 875 | Quarterly | Simultaneous | .... | Inside | ........ |
| **Texas:** | | | | | | | |
| Amarillo ......... | 2,775 | 90% | Monthly | Three districts | 30 water and electric | Outside | ........ |
| Austin ........... | 6,070 | Majority | Monthly | Rotation | .... | Outside | $250 per month |
| Dallas ........... | 27,621 | 26,789 | Monthly | Six districts | 50 | Outside | 16c per month |
| El Paso .......... | 9,750 | .... | Monthly | By districts | 19 | Outside | $568.85 (April) |
| Galveston ........ | 7,248 | 7,048 | Monthly | Rotation | 40 | Both | $12.30 per million gal. |
| McKinney ........ | 1,200 | Nearly all | Monthly | Simultaneous | 20 | Outside | $60 |
| Temple ........... | 2,400 | 2,376 | Residence quarterly, manufacturing plants monthly | Simultaneous | 20§ | Outside | ........ |
| Taylor ........... | 975 | 954 | Monthly | Simultaneous | 25 | Outside | $30 |
| Vernon ........... | 35 | 29 | Monthly | Simultaneous | 20 | Mostly outside | $30 |
| Waco ............ | 7,000 | 6,250 | Monthly | Simultaneous | 400 a day | Outside | 25c per meter |
| Weatherford ...... | 650 | 625 | Monthly | Simultaneous | 25 | Outside | ........ |
| **Vermont:** | | | | | | | |
| Bennington ....... | 35 | 25 | Semi-monthly | Simultaneous | 15 | Inside | Nothing |
| Essex Junction.... | 200 | 98% | Semi-annually | Simultaneous | 1 man in 2 days | Mostly inside | $25, including repairs |
| Fair Haven....... | 10 | 8 | Semi-annually | ........ | .... | Inside | $5 |
| Montpelier ....... | 5 | 4 | Semi-annually | Simultaneous | .... | 4 in, 1 out | ........ |
| Northfield ........ | 238 | 232 | Quarterly | Simultaneous | .... | Both | ........ |
| Richford ......... | 6 | None | Semi-annually | ........ | .... | Inside | ........ |
| **Virginia:** | | | | | | | |
| Charlottesville .... | 1,418 | 1,393 | Mostly quarterly | Simultaneous | 20 to 30 | Mostly outside | $50 to $60 per quarter |
| Danville ......... | 4,200 | 3,993 | Monthly | Simultaneous | 25 | Outside | ........ |
| Fredericksburg ... | 44 | 23 | Quarterly | Simultaneous | .... | Both | $3 per quarter |
| Pulaski .......... | 6 | 6 | Quarterly | Simultaneous | .... | | ........ |
| Richmond ........ | 24,165 | 23,121 | Monthly | Districts | 20 | Outside | ........ |
| **Washington:** | | | | | | | |
| Auburn ........... | 63 | 52 | Monthly | Simultaneous | 10 | Outside | 17c per meter per month |
| Bellingham ....... | 1,375 | 80% | Monthly | By districts | .... | Outside | ........ |
| Centralia ........ | 150 | 125 | Monthly | Simultaneous | 12 | Both | 12c per meter per month |
| Chehalis ......... | 97 | 79 | Monthly | Simultaneous | 14* | Both | 20c per meter per month |
| Ellensburg ....... | 150 | 135 | Monthly | Simultaneous | 15 | Outside | 25c per year |
| Hoquiam ......... | 900 | 850 | Monthly | Simultaneous | 30 | Outside | ........ |
| Olympia .......... | 1,600 | 1,500 | Monthly | Simultaneous | 33 | Outside | $120 per month |
| Port Townsend.... | 35 | 24 | Monthly | Simultaneous | .... | Outside | ........ |
| Pullman .......... | 801 | 797 | Monthly | ........ | 20 | 90% outside | $25 per month |
| Seattle .......... | 47,867 | 44,766 | Monthly | By districts | ‡350 | Outside | 11c for each bill rendered |
| Spokane ......... | 21,700 | 20,635 | Residence, every 4 months; business monthly | In rotation | 10 | Both | $500 per month |
| Walla Walla...... | 942 | 881 | Monthly | ........ | .... | Outside | ........ |
| Wenatchee ....... | 567 | 547 | Monthly | ........ | 24 | Outside | 3½c |
| Winlock .......... | 75 | 75 | Monthly | Simultaneous | 20 | Mostly outside | ........ |
| **West Virginia:** | | | | | | | |
| Elkins ............ | 125 | 40 | Quarterly | Simultaneous | In 1 day | Both | ........ |
| Fairmont ......... | 1,768 | 1,462 | Monthly and bi-monthly | Simultaneous | 25 | Mostly inside | $150 per month |
| Princeton ........ | 850 | 848 | Monthly | Simultaneous | 25 | Outside | 4c per meter per month |
| **Wisconsin:** | | | | | | | |
| Beloit ........... | 3,107 | 3,022 | Quarterly | 3 districts | 20 | Inside | ........ |
| Columbus ........ | 570 | 7 | Every 4 months | Simultaneous | 25 | Inside | ........ |
| De Pere .......... | 625 | 624 | Quarterly | ........ | .... | Both | ........ |
| Eau Claire........ | 2,602 | 2,512 | Semi-annually; large ones monthly | Simultaneous | 10 | Mostly inside | $1,004.89 in 1918 |
| Fond du Lac...... | 3,505 | 3,399 | Mostly quarterly | Simultaneous | 20 | Mostly inside | $340.77 reading |
| Grand Rapids...... | 1,150 | 1,118 | Quarterly | Simultaneous | 20 | Inside | $60 per quarter |
| Green Bay........ | 5,046 | 5,076 | Quarterly | 3 districts | 12 | Both | $150 per month |
| Janesville ........ | 1,350 | 1,300 | Quarterly | Simultaneous | 10 | Inside | $65 per quarter |
| Lebanon .......... | 5,330 | 5,095 | Quarterly | Rotation | 12 | Inside when possible | $150 per month |
| Menominee ....... | 400 | 380 | Quarterly | Simultaneous | .... | Both | ........ |
| Milwaukee ....... | 65,092 | 62,893 | Monthly | Simultaneous | 15 | Inside | $1.11 per meter per year |
| Portage .......... | 5 | 0 | Monthly | Simultaneous | .... | Inside | ........ |
| Shawano ......... | 375 | 370 | Quarterly | Simultaneous | 25 | Inside | $20 |
| Stevens Point..... | 489 | 410 | Quarterly | Simultaneous | .... | Both | ........ |
| Two Rivers....... | 1,000 | 925 | Quarterly | Simultaneous | 10 | Inside | $75 per month |
| Watertown ....... | 1,510 | 1,474 | Quarterly | Simultaneous | 20 | 99% inside | $100 per month |
| **Wyoming:** | | | | | | | |
| Green River and Rock Springs ..... | 900 | 890 | Monthly | Simultaneous | 30 | Both | 5c each per month |

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* Meters far apart. § In residence district. ‡ Probably per day.

# LEGAL NEWS

## A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

### Loss of Money by Bather—Liability of City.

(N. Y. Sup.) A city cannot be held liable for loss of money in pocket of bather's clothes, hung on a hook in a public bathhouse maintained by the city and freedom from negligence by the bather.—Walker v. City of Buffalo, 175 N. Y. S. 274.

City employe, attendant in public bathhouse maintained by city for free use of the public, was not negligent in failing to detect the theft of a large sum of money from bather's clothes, hung on a hook; the employe having no knowledge that there were valuables in such clothes.—Id.

Bather could not recover from city, maintaining public bathhouse, for money stolen from the pocket of his clothes hung on hook while he was taking a bath, as he was negligent, knowing that door of compartment in which clothes were hung was unlocked.—Id.

### Defect in Boulevard Built by Park Commission—Liability.

(Mass.) St. 1893, c. 407, St. 1894, c. 483, and St. 1895, cc. 305, 450, under which land was appropriated to public use by Metropolitan Park Commission, imposed no liability on commission for defect or want of repair in land so taken and used as boulevard, so that pedestrian had no right to recover for injury by defect.—Gero v. De Las Casas, 122 N. E. 415.

Mere fact that boulevard was constructed by Metropolitan Park Commission through park does not give pedestrian injured through defect cause of action against commission; no liability being imposed by statutes under which boulevard was laid out (St. 1893, c. 407; St. 1894, c. 483; St. 1895, cc. 305, 450), despite St. 1894, c. 288.—Id.

### Snow and Ice on Sidewalk—Liability of City for Injury.

(Mo. App.) A general condition of snow and ice accumulations on sidewalk, due to alternative thawing and freezing and the tracking and disturbance by pedestrians, unless specially dangerous, does not render the city negligent.—Abbott v. City of Springfield, 210 S. W. 443.

A ridge or ball of ice on the sidewalk, just outside the single beaten path, caused by overflow from downspout on adjoining building, and concealed by covering of snow, is an actionable defect in case of injury therefrom to pedestrian; the city having knowledge thereof.—Id.

### Error in Drawing—Recovery by Contractor of Damages.

(N. Y. Sup.) Where plaintiffs did not rely upon drawing annexed to specifications for installation of a high pressure fire service system, stated to have been drawn on scale of 200 feet to an inch, but drawn on scale of 150 feet, but knew of error when submitting bid, did not report error to engineer, and proceeded with contract after engineer had notified them thereof, and were cautioned as to inaccuracy of quantity in "Information for Bidders," and city took over and paid for extra pipe plaintiffs had bought, they cannot take advantage of honest mistake of city and recover damages, on the theory of city preventing their carrying out full contract.—Carfagno v. City of New York, 175 N. Y. S. 682.

### Annexation by City of Territory—Taxation—Improvements.

(Va.) In determining value of city's half interest in a ferry franchise, the question being material, in proceedings by the city to annex territory, on the issue of its ability to take care of new and old financial obligations, the court will regard, not only the present rental value of the franchise, but also its sale value, and its prospective rental value after termination of the existing lease.—Norfolk County v. City of Portsmouth, 98 S. E. 755.

The objection that an annexation to a city was improper on account of the pendency of war, with consequent unsettled conditions, or at least of the transition period from war to peace while the peace treaty was being debated, was met by provision of annexation ordinance that city should not issue bonds mentioned until after next general assessment of lands, which would not occur for twenty months.—Id.

Prospective increases in taxation charges upon property owners in territory sought to be annexed to adjacent city held not to afford reason why annexation should not be had, annexed territory being in fact an overgrowth from or adjunct to the city, and enjoying, without paying therefor, many benefits which residents of city paid for, such as fire protection, while annexation would bring about installation of many necessary improvements in way of sewerage and bridging in annexed territory.—Id.

Part of land sought to be annexed by a city and occupied by a railroad and other industries, whose burdens of taxation would be largely increased by the annexation, was properly annexed, in view of benefits to railroad and industries from any benefits to annexed territory, particularly where land occupied by them was necessary to form annexed territory into a reasonably compact body of land, as required by statute.—Id.

Where it appears, in proceedings to annex territory to a city, that the interests of two wards of the city may suffer by the annexation, in that it may delay installation of an adequate sewerage system for such wards, the annexation order will be amended to require the city to install such a system after the next assessment of land, when it obligates itself to furnish sewerage to the annexed territory.—Id.

### Validity of Ordinance—Determining Question.

(Md.) In passing on the validity of a city ordinance, the determining question is what may be done under its authority, and not by what has been done under it.—Levering v. Williams, 106 A. 176.

### Resignation of Police Officer Under Charges—Recovery for Services.

(Mass.) Where a city's police officer waived all right to hearing on charges of drunkenness preferred against him, and acquiesced in all that was done by the board of aldermen at a meeting when it accepted his resignation as requested by him, he was not entitled to recover for services subsequent to the date of the resignation.—Ladd v. City of Newburyport, 122 N. E. 874.

### Ratification of Irregular Contract Which Is Not Binding.

(Ariz.) Generally a contract which is within the scope of the powers of a municipal corporation or public body, but which, owing to some irregularity, is not binding upon the corporation or body, may be ratified.—Hermance v. Public School Dist. No. 2 of Maricopa County, 180 P. 442.

A municipal corporation's contract, which is not binding upon the corporation because of some irregularity, may be ratified, though statute requires the contract be in writing.—Id.

### Deviation from Plans in Sewer Construction.

(Ore.) City suing sewer contractor for failure to construct sewer according to contract plans and specifications has burden of proving that contractor failed to perform the requirements of contract specifically as mentioned in the complaint.—City of Seaside v. Randles, 180 P. 319.

In city's action against sewer contractor for failure to construct sewer according to contract, where contract expressly stipulated that city engineer had no authority to release contractor from a necessary and important requirement of the contract, evidence that engineer had instructed contractor's foreman to deviate from plans and specifications was inadmissible.—Id.

In city's action against sewer contractor for failure to construct sewer according to plans and specifications, where contract required contractor to make joints tight and to fill every part of the joint with mortar where required, or oakum where required, instruction that it was contractor's duty to make a "tight joint" in each of the sewer joints, with cement mortar of the required mixture, was proper.—Id.

# NEWS OF THE SOCIETIES

**Sept. 30-Oct. 1-3.**—NEW ENGLAND WATERWORKS ASSOCIATION. Annual meeting. Albany, N. Y. Secretary, Tremont Temple, Boston, Mass.

**Oct. 27-30.**—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, New Orleans, La. Secretary, A. W. Hedrich, 169 Massachusetts ave., Boston, Mass.

**Nov. 12-14.**—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Springfield, Ill.

### American Institute of Electrical Engineers.

The report of the committee on development of the American Institute of Electrical Engineers was presented to the board of directors of the institute at a meeting held in New York City, Aug. 12, 1919, by Calvert Townley, chairman of the committee.

The executive committee in February had prepared a communication to its section members, dividing the subject to be considered into three major headings, namely:

1. The relation of the institute to its members.
2. The relation of the institute to other engineering organizations.
3. The relation of the institute to the public.

Under each heading a series of questions was set up designed to bring out as full a discussion as possible and to make it clear that it was the duty and privilege of the committee to consider every angle of institute affairs. This letter in addition to being sent to each member of the committee on development was brought to the attention of the membership and the sections in order encourage suggestions. At a meeting of the executive committee in May, communications had been received from 16 sections and from a number of individual members. These communications expressed such a general unanimity of opinion on many of the questions considered as to indicate very clearly the wishes of the great body of the members and incidentally to make the work of compiling the views of the different sections simple.

The committee recognized that engineers do not participate as actively or as prominently in public affairs as they should, and that both the public welfare and their own individual advancement would be promoted if this could be changed. Two general reasons were believed to be responsible for this—one, a lack of any general organization of engineers which would facilitate such co-operation, and, second, too great technical specialization in the engineering curricula of technical schools and colleges.

The first of these reasons was very generally brought up in one form or another by the sections, and, although it is recognized that a corrective can be applied only by co-operation with other engineering bodies, it was felt that a constructive step would be taken by adopting a skeleton plan for co-operation and then appoint conferees to discuss the matter with other societies. With this object the committee recommended:

> Local Federation.—(a) That a comprehensive but flexible uniform outline for the federation of local engineering bodies be prepared, taking advantage of the experience already gained by existing affiliations.
>
> (b) That we use our endeavors to have the other national societies establish and support local sections along lines similar to ours, but do not confine local federations to such branches, rather planning to include all the worthy engineering bodies.
>
> (c) That wherever such federations can be organized there be established under an appropriate name a federated local council of engineers to be made up of a properly apportioned number of representatives from the different locals.
>
> National Council.—(a) That there be established a direct touch between each local federated council and a national engineering council composed of delegates from as many national engineering societies as are willing and worthy to participate.
>
> (b) That through the medium of the national and the local federated councils there be perfected a working arrangement for engineering co-operation in all public affairs where such is desirable.
>
> Engineering Congress.—That there be inaugurated the custom of periodically holding an engineering congress, the delegates to which should be selected from all parts of the country under a plan to be developed for suitable representation, this congress to consider and take action on such matters of general interest to engineers and to the public as may merit its attention and as have been previously advertised, for a sufficient length of time, to permit locals everywhere to give them consideration and when possible to send instructed delegates.

The second reason, although of great importance, has not been generally considered. It was, however, the unanimous view of the members attending the convention that this matter should receive early and thorough consideration by the institute, and the following preamble and resolution was there presented and adopted:

> As the individual engineer cannot look for greater public recognition or individual advancement than his training and fitness warrant:
>
> And, in the belief that the bigger development of the profession consists in broader social and public service by publicly-minded engineers;
>
> Recognizing that on the one hand young engineers are employed for too long a period at work which does not stress their capabilities and, on the other, that the demands of industry for ever-increasing numbers of technicians must be supplied;
>
> And having in mind the excellent precedents established by the medical and legal professions;
>
> This committee would welcome the establishment at the earliest date practicable of a normal six years' collegiate course in engineering, two years of which at the least should be devoted to training in the humane arts and sciences, including, for example, political science, economics, history and general letters, the last four years being devoted to sound training in the sciences and in only the fundamentals of diversified engineering.
>
> With or prior to such a development we endorse a program for the marked extension of vocational training in the industrial centers in order that the needs of industry may be met.
>
> To the accomplishment of these ends this committee requests the appointment of representatives to serve on a joint committee of engineering organizations to promote such a national educational program as shall provide for the future necessities of the engineering profession consistent with the needs of society.

### National Safety Council.

The eighth annual congress of the National Safety Council will be held at Cleveland, Oct. 1 to 4. There will be four general sessions, four round tables, and 35 sectional meetings. All general sessions will be open at 2 p.m., and the sectional meetings at 9:30 a.m. Among the sectional meetings will be two on each of the following sections: Construction, electric, railway, health service, public safety, and public utilities.

The first general session will be devoted entirely to a discussion of employees representation under the following subheads: "Co-operation and Industrial Progress," "Labor Management and Collective Bargaining," "Practical Aspects of Employees' Representation" and Employees' Representation from the Standpoint of Organized Labor.

### American Association of Engineers.

The Joint Commission on Reclassification of Salaries, created by the 65th Congress and instructed to investigate the rates of compensation paid to civilian employes by the municipal government and other government establishments in the District of Columbia, is engaged in making a preliminary classification. The Washington Chapter of the American Association of Engineers is securing information relative to the salaries of technical men included within the scope of the investigation the Commission is authorized to make, and making recommendations as to the revisions which should be made. The actual preparations of the Commission's report is being made by Arthur Young and Company, efficiency engineers.

The refusal of the president of the Borough of Queens to meet representatives of the Union of Technical Men who were asking an increase in salaries on the ground that "the talents and abilities of engineers and draftsmen differ so widely in value that they should establish a standard of salaries before making any demands upon the city of New York," has given a new impetus to the investigation of salary conditions in that city being made by the New York Chapter of the American Association of Engineers. The public service committee of this chapter is conducting a thorough investigation of conditions in city departments, on the Public Service Commission and among the members of the Transit Commissioner's force. Questionnaires have been issued to all engineers in public service in the city and the responses indicate that it will be but a short time until full data will be at hand upon which to base a schedule of salaries. When completed, the report, together with whatever action the Chapter recommends, will be sent to the proper officials with a request for action.

## INDUSTRIAL NEWS

**Wallace & Tiernan Co., Inc.,** New York City, which manufactures chlorine control apparatus, announces that Capt. Lucius A. Fritze, Sanitary Corps, U. S. Army, has become associated with the technical staff of the company.. Capt. Fritze, who was sanitary officer of the Rainbow Division, after the armistice, was assigned to the office of the Surgeon General in Washington and while there prepared a history of the Sanitary Corps of the A. E. F. Capt. Fritze will be the manager of a new office which Wallace & Tiernan Company is opening at Kansas City, Mo., serving territory comprised in the states of Montana, Wyoming, Colorado, North Dakota, South Dakota, Nebraska, Kansas and Missouri.

**The Goodyear Tire & Rubber Company,** Akron, Ohio, has issued a neat and very interesting booklet entitled "The Story of the Tire." The romance of rubber and of the development of the present-day automobile tire is recorded in a readable and informative way, profusely illustrated with good photographs. Every stage in preparation and manufacture of the material from tree to final product is described and pictured.

### National Conference to Study Industrial Problems.

The vital problems of business, as affected by post-war and industrial developments, will be discussed at a national "Our Country First" conference to be held in Chicago September 8 and 9 under the auspices of the Illinois Manufacturers' Association. The sessions will be at the Congress Hotel.

Trade and industrial associations in every line have been invited to appoint delegates, and to participate in what is believed will be a meeting of moment, inasmuch as it will enable business to present concretely its attitude on some of the questions now before the lawmakers at Washington, and some of the proposals of a revolutionary nature that have been presented from various sources in the past few months.

Representation is to be given at the conference not only to business, but to the farming interests, since it is pointed out that agriculture, after all, is one of the greatest businesses of the country. Leaders of organized labor have also been invited to talk, and to state where the demands of workers are going to stop.

Some of the subjects which it has been suggested be discussed at the conference are the following:

Participation in private business on the part of the Federal government.

Nationalization of industry.

Influence of exports on prices and production.

Possibilities of increasing production.

The relation of the United States to the rehabilitation of industry in Europe.

Stabilization and guarantee of contracts.

Definition of profiteering.

The attitude of employing farmers and manufacturers to labor.

Adjustment between property rights and community interests.

Participation of labor in the management of industry.

Increasing the purchasing power of the dollar.

Distribution of the war debt.

Governmental price fixing.

The Plumb plan.

One of the significant results of the conference will probably be the appointment of a permanent committee to be stationed at Washington for the purpose of studying legislation affecting business men. Charles Piez, president of the Link-Belt Company, of Chicago, and former president of the Emergency Fleet Corporation, is chairman of the Resolutions Committee for the conference, and it is believed that this is one of the resolutions which will have consideration.

The attendance at the conference, which will be held at the Congress Hotel, will be in excess of 1,000, it is indicated. More than 600 delegates have already been accredited.

The meeting will be called to order by D. E. Felt, of the Felt & Tarrant Mfg. Company, of Chicago, who is president of the Illinois Manufacturers' Association.

## PERSONALS

Horrigan, E. J., has been appointed local manager of the Taunton, Mass., municipal light plant. After graduating in mechanical engineering from Brown University in 1915, he was associated with the Blackstone Valley Gas & Electric Light Company at Pawtucket. Then for a year he was efficiency engineer of a plant and later master mechanic and mechanical engineer for the same plant. For several months he was in the national service as mechanical expert in the United States Navy on foreign duty, and very recently he was associated with Warren B. Lewis, of Providence, a consulting engineer.

Smith, Charles C., has resigned as city engineer of San Angelo, Tex., to become county engineer of Schleicher County, Tex.

Burch, Warren B., city engineer of San Luis Obispo, Cal., for four years, has become county engineer of San Luis Obispo County.

Lynch, William J., has resigned as assistant engineer of Nutley, N. J.

Ramp, W. H., has resigned as city engineer of Parkersburg, W. Va., to join the North Carolina State Highway Department.

Joyner, Frank H., until recently road commissioner of Los Angeles County, Cal., and before his appointment to that position division engineer of the Massachusetts State Highway Commission, has become chief engineer of the California Willite Road Construction Co., and consulting engineer of the Western Willite Road Construction Co., Los Angeles.

McFadden, H. S., formerly with the Kansas State Highway Commission, is the president of the newly organized Kansas Engineering Co., Topeka, Kan. J. A. Campbell, Jr., and C. B. McKey are president and secretary, respectively, of the company, which will specialize in road surveys for Federal-aid road work.

Boyle, Blair, county engineer of Geary County, Kan., has resigned to become county engineer for Bourbon County, Kan., with headquarters at Fort Scott.

Pratt, Maj. Arthur H., 26th Engineers, U. S. A., has been discharged, and has been appointed designing engineer for the North Jersey District Water-Supply Commission, which is developing the Wanaque River at Midvale, N. J., to supply Newark and neighboring municipalities.

Bronson, Capt. Howard, U. S. A., for two years camp sanitary engineer at Camp Upton, N. Y., has received his discharge to return to the Pennsylvania State Department of Health as sanitary engineer in the engineering division.

Giorloff, Lieut. George A., U. S. A., has received his discharge, and has become associated with the Towanda Construction Co. as superintending engineer on state highway construction near Towanda, Penn.

Pratt, Paul D., chief engineer of the Montana State Highway Commission, has resigned to become associated with the State Highway Construction Co., Helena.

Gregory, Charles E., formerly engineer of drainage and sewage disposal, Borough of Manhattan, New York City, has resigned, and is now deputy engineer of the North Jersey District Water-Supply Commission.

Murray, Joseph A. Jr., has resigned as lieutenant, junior grade, U. S. N., and has returned to the Bureau of Engineering, Albany, N. Y., where he has been appointed engineer in charge of the sewage disposal system.

Graham, Capt. Germain P., 20th Engineers, U. S. A., has been discharged and has resumed his work as assistant engineer in charge of construction, Bureau of Engineering, Albany, N. Y.

Bilger, H. E., has resigned as road engineer for the Illinois Highway Department, and has become consulting engineer for the Monmouth Stone Co., Monmouth, Ill. Mr. Bilger was with the department for twelve years.

The members of the consulting engineering firm of Kastenhuber & Anderson, Easton, Md., having been released from service with the army, have reopened their office and will resume the practice of engineering and surveying.

# Municipal Journal & Public Works.

City County State

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## AWARDING CONTRACT TO INFORMAL BIDDER.

The awarding of a contract to an informal bidder after formal bids had been opened and their prices presumably made known to him is given publicity in a letter from the secretary of the Associated General Contractors, extracts from which are quoted elsewhere in this issue. The contract is for fifty-five miles of grading and was bid upon by several well-known firms of contractors.

Whether or not such an award was legal in Arkansas, it shows either a dense ignorance of the ethics of public works letting, or a disregard of them, which will undoubtedly react against the interests of those represented by the board if not of the entire state. No contractors of any standing will go to the expense of bidding again on work where such unfairness to them is to be feared, and the result will probably be that only irresponsible bidders, if any, will respond to invitations to bid upon the completion of this road.

It is to be hoped that the publicity given to this case by the contractors will prevent any similar acts by officials who do not realize the moral aspect of such practice.

## MUNICIPAL BOND SALES BREAK THE RECORD.

The sales of municipal bonds for the first eight months of 1919 exceed by more than twenty per cent the highest total for any previous similar period, according to the Bond Buyer, which also states:

"During the balance of the year it is conservatively estimated that bond sales will average $40,000,000 a month. At that rate the year's total would be approximately $600,000,000, or more than $100,000,000 in excess of any previous annual flotation of domestic state and municipal issues."

The sales for August totaled $57,022,280, the highest previous August total having been $32,153,413 in 1918; while for the eight months of this year the total is $440,495,822, as compared with $366,596,258, the highest previous total for the same period, reached in 1915.

## OVERWORKING CITY ENGINEERS.

The importance of competent engineering advice and supervision for municipal public works is so seldom realized by city officials, that it is gratifying to find Mayor Fitzgerald, of Seattle, appreciating that the regular engineering work of that city is sufficient to demand the entire time and attention of city engineer Dimock, and that he should not be asked to assume the additional responsibility of constructing the Skagit power plant. Said Mayor Fitzgerald a few days ago.

"I am convinced that the city engineer has too much other business to be able to devote the time required on a project as big as Skagit. The engineer's office is overloaded with other work that is more than enough to require the full attention of any one man. My belief is that we should hire a special engineer, one of the best we can find, and put him in charge of the Skagit construction. leaving the city engineer free to take care of the constantly increasing volume of other municipal work."

Another point, which also seems to be appreciated by the mayor, is that a city engineer is a "general practitioner" and should not be expected to be an expert along individual lines; and when a work of unusual magnitude arises, justice to the city engineer and protection to the city suggest that a specialist be employed to take charge of it; and this without any reflection on the ability of the city engineer.

# SEWERAGE WORKS OF STRATFORD, CONN.

### Invert of Sewer at Plant Is Three Feet Below High Tide and Three Feet Above Low Tide—Effluent Held in Tidal Chamber During Flood Tide—Imhoff Tanks and Chlorination.

By CLYDE POTTS, M. Am. Soc. C. E.*

The town of Stratford, Conn., which adjoins the city of Bridgeport, is one of the oldest towns in the state of Connecticut. At the present time it has a population of about 10,000 people, and until the installation of the present sewerage system, there were no sanitary sewers in the town. While the town has a plentiful supply of water and the houses generally are equipped with modern plumbing, the sewage was disposed of in cesspools.

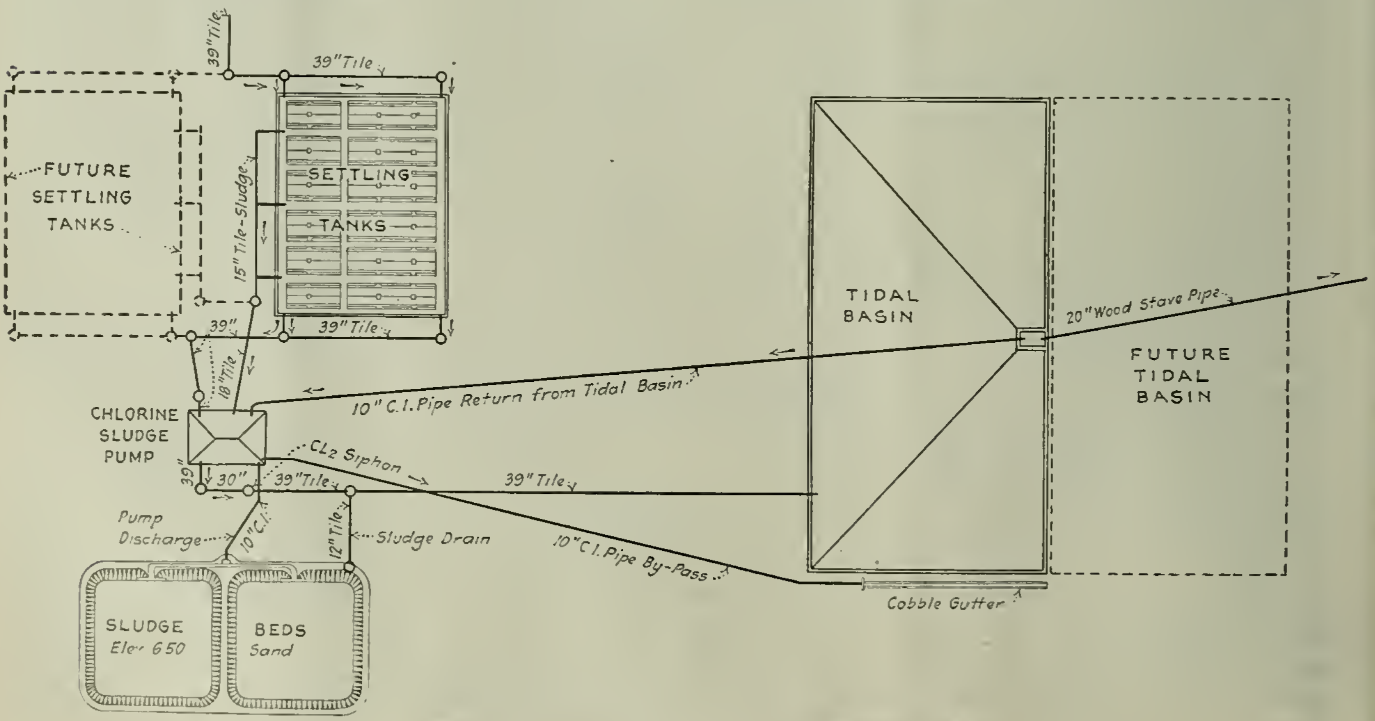
The town of Stratford is extensive in area, the built up portion covering an area about one and one half miles square. The lower or southerly portion of the town is flat, being but a few feet above high tide. The central and northerly portion rises somewhat in height, and is underlaid with ledge rock.

In designing the sewerage system, the instructions of the sewerage commission were to limit the pumping to as small an area as possible, in order to reduce the annual upkeep. It was thought desirable, if possible, to design a comprehensive system covering the entire town with the object of building the portions most needed and do away entirely with any pumping stations.

The method of sewage disposal which seemed most practicable was sedimentation in two-story tanks followed by disinfection with chlorine gas, and this method was recommended and adopted by the sewerage commission. The effluent is discharged into the Housatonic river. This river is a tidal stream and its waters are used in the production of shell fish.

The sewerage system as designed calls for the ultimate construction of about 60 miles of pipe sewers ranging in size from 8 inches to 30 inches. The town of Stratford is in two drainage areas. The westerly portion drains to Bruce's Creek, and the easterly portion to the Housatonic river. In order to concentrate the sewage at one point on the Housatonic river, a 30-inch trunk sewer was laid westerly from the river into Bruce's creek drainage area and the sewage from the westerly portion of the town carried through this 39-inch trunk to the plant. A 24-inch trunk sewer laid northerly along the Housatonic river gathers up the sewage from the easterly portion. A treatment plant was designed for an ultimate population of 40,000 people, having a capacity of four million gallons per day.

The portion under contract calls for the construction of one-half of the settling tanks and one-half of the tidal basins, and the chlorine house. In order to avoid pumping, the sewage is delivered to the settling tanks at an elevation of plus 3, which is 3 ft. below high tide. The effluent from the settling tanks is not discharged directly into the river, but is discharged into a tidal basin, the discharge point of which is at zero, or average low tide. It



GENERAL PLAN OF SEWAGE TREATMENT PLANT.

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*Consulting Engineer, New York City.

is the province of this tidal basin, during a time when the tide is above elevation plus 4, to store up the tank effluent until the tide recedes below elevation plus 4, when it will begin discharging the tank effluent into the river, and will completely discharge the stored effluent before the next return of the high tide.

The discharge of tank effluent from the tidal basin is through a balanced valve. This valve is so adjusted that as the tide level rises above the tank level, the valve is closed to prevent the inlet of tide water and the valve opens again immediately as soon as the tide level recedes below the tank level. This is shown in the accompanying detail drawing.

The two-story tanks were computed on the basis of two hours detention in the settling chambers. In order to remove the sludge from the tanks it was necessary to provide a sludge pump to elevate the sludge to the filter beds. In other respects, the design of the sewage works is in accordance with standard practice.

The sewerage commission of the town of Stratford is: F. S. Beardsley, chairman; B. C. Warner and Paul Goodell, secretary. Mr. Goodell also acts as resident engineer in charge of construction of the sewerage system and sewage disposal works.

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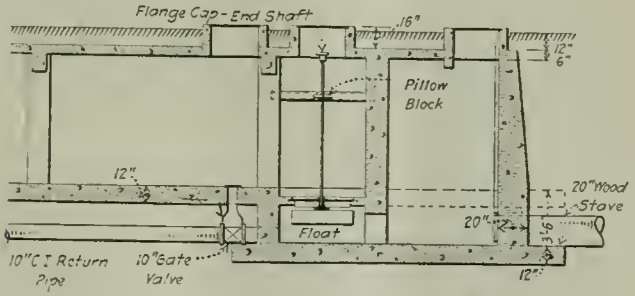
The above description by Mr. Potts gives a comprehensive general idea of this system, but a few more details will probably be interesting to many engineers. The accompanying plan shows the general layout of the plant, including the spaces provided for duplicating the setttling tanks and tidal basin; while the cross-section shows the float and float chamber.

Owing to the slight fall available, every effort was made to keep at a minimum the head consumed in the plant. The elevation at the plant of the invert of the 39-inch pipe which brings the sewage to the plant is 3.0 feet above mean low tide. The settling tanks are designed on the assumption that the sewage flowing through will stand at elevation 4.5, or one and a half inches lower than the center of the outfall sewer at the plant. There is a fall of 0.05 foot to the chlorine plant and of 0.6 foot to the tidal basin. The discharge point of the tidal basin is at zero, or mean low tide, while the water may rise in the basin to elevation 4.0, or six inches below the level of the water in the settling tanks, before the valve prevents further inflow of the tidal water.

There are six two-story (Imhoff) settling tanks, each divided into five hopper bottoms, each hopper being provided with a sludge pipe discharging into a sludge channel, there being one channel between each pair of tanks. The flowing-through trough has a double sloping bottom with a V-beam beneath the slot to exclude the rising gases; the slope of the bottom being 5.4 feet vertical to 4.6 feet horizontal. The elevation of the hopper is —13.25, and that of the top of the tank wall is 9.0, giving a total inside depth of 22¼ feet.

Since the sludge beds were placed at elevation 6.5, while the sludge is drawn off at elevation —2.0, it is necessary to pump the sludge, which is discharged by the pumps onto the beds through a 10-inch cast iron pipe. The sludge pump is a vertical centrifugal pump set in a dry well and drawing from a sludge well, the two being separated by a 20-inch concrete wall. The pump suction is at —6.5, while the motor driving the pump is located on the floor of the station at elevation 9.75. In one end of the 32-foot by 22-foot 8-inch building which contains the sludge pump is a liquid chlorine plant and a float chamber and float to be used in connection with the proportionate feed control of the chlorine. The superstructure of the building is brick with a steel truss roof covered with shingle tile.

The settling tanks occupy a space 94 feet by 72 feet, and are surrounded by a concrete wall, the surface of which is relieved by columns and panels, and which is eight feet high in the clear and is provided with a double-swing heavy oak door at the middle of each side.



CROSS-SECTION OF FLOAT CHAMBER.

The tidal basin is 200 feet by 100 feet inside dimension, with a 12-inch floor, the elevation of which is 0.0 at the float chamber and 0.5 at the corners. The roof is of concrete beam and slab construction; the underside of the slabs being at elevation 7.0. The slabs are six inches thick and the beams supporting them are 12 by 12; the beams being supported by 14 by 14-inch columns spaced 12 feet 6 inches between centers. The roof slab is reinforced with ½-inch bars spaced six inches apart in one direction, and ⅜-inch square bars 24 inches apart in the other direction. The roof is covered with twelve inches of earth. A manhole through the roof is provided at each corner and at the float chamber, and another at the center of the basin.

The sludge beds are fifty feet square at the tops of the banks, the banks sloping 1½ to 1 and being four feet high. The bottom of each bed is provided with 4-inch tile drains in parallel rows spaced four feet apart. Six inches of broken stone covers the bottom, on which is twelve inches of sand. The channels or troughs used for bringing the sludge onto the beds are U-shaped, a great improvement over the square channels so often found in sewage treatment plants.

The float chamber in the tidal basin is 6 feet by 5 feet inside dimensions, the bottom being at elevation —3.5, which is also the elevation of the 20-inch wood stave pipe which connects the chamber with the river. The float is made of quarter-inch galvanized steel plates, 40 inches in diameter and 18 inches deep, stiffened by means of 3-inch by 3-inch angles welded to the inside of the top and bottom plates.

To the top of the float is riveted a circular ring, machined on the top, which, when the float is lifted by high tide, forms a water-tight connection with another iron ring machined on the bottom, through which ring the plant effluent flows in entering the wood stave outlet pipe, until the float rises and prevents further discharge of the effluent or entrance of the tidal water.

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## THREE MILLION FOR COLUMBUS' WATER WORKS.

The City Council of Columbus, O., is considering a proposal to submit to popular vote in November a bond issue of $3,000,000, the proceeds to be used for constructing additional storage, purifying, softening facilities in connection with the water supply, and adding to the distribution system. It is estimated that $297,000 will be required for enlarging the purification plant, $1,509,000 for increased storage, $135,000 for new pumping machinery, and $550,000 for new mains.

# EFFECT OF IMPACT OF TRUCKS.

### Tests Being Made by Bureau of Public Roads—Apparatus Used and Test Conditions—Results Obtained Thus Far.

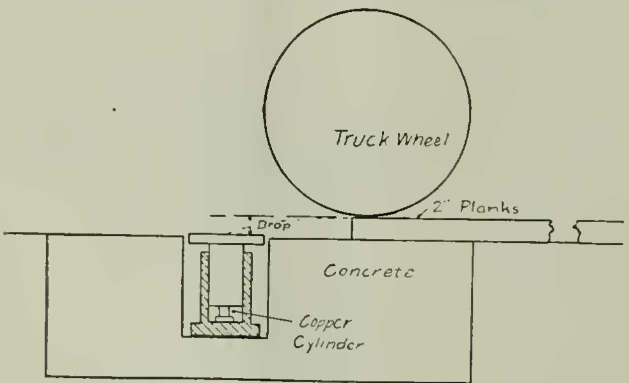
The Bureau of Public Roads is carrying on quite an ambitious program of tests on the various effects of different kinds of traffic upon the different classes of roads in common use. The stresses caused by loads upon concrete pavements and bases is one of the investigations now under way, the preliminary results of which were reported in our issue of June 28th.

There are also being conducted at the Arlington experimental farm a series of tests in which the impact effects of motor trucks are being measured. For this investigation, a scheme is employed similar to that used in the Ordinance Department of the army for obtaining gun pressures, which consists in subjecting small copper cylinders to the effect of a blow and measuring the resulting deformation of the cylinder. It is proposed to follow this with an investigation of the destructive effects of trucks of different weights by actually subjecting test sections of roads to impact effects, and a machine is now being built for making this investigation.

A preliminary report on the measurements of impact occasioned by trucks of various weights under different conditions has been made recently by E. B. Smith, senior assistant testing engineer, and J. T. Pauls, highway engineer; which report we summarize below.

#### APPARATUS USED.

The apparatus used in these experiments consists of a heavy steel cylinder in which is fitted a plunger four inches in diameter and eight inches long, similar in construction to a hydraulic jack. A hole is bored in the bottom of the cylinder to prevent air from cushioning under the plunger. On the top or head of the plunger there is securely fastened a heavy steel plate on which the impact of the truck wheel is received. The cylinder is placed in a heavy concrete box which is set in the road in such a position that the height of the steel plate on top of the plunger may be made just flush with the road surface. Inside the cylinder and under the plunger is placed a copper cylinder one-half inch in diameter by one-half inch long, which measures by its deformation the static load, as referred to above. The height of the upper surface of the steel plate can be varied by placing steel discs under the plunger. The impact of the rear wheel of a truck is much greater than that of the front wheel, and it is this greater impact that is measured. In order that the front wheel may pass over and not touch the steel plate on the plunger, a steel bridge is used which is automatically tripped by the front wheel in passing over it, a catch being released which causes a weighted lever to remove the bridge and leave the steel plate exposed to receive the impact of the rear wheel. The approach to this impact apparatus is made with 2-inch planking about twenty feet long which can be so adjusted as to give various heights of drop and can also be moved forward and backward so as to give the proper jumping distance from the jumping-off point so that the wheel will strike the center of the plunger at the particular speed employed for each test.



APPARATUS USED IN MAKING TESTS.

The small copper cylinders used to register the impact are prepared from pure copper bars which are carefully machined to dimensions and are subjected to a standard annealing process. The finished cylinders are tested for uniformity, five cylinders being taken from each lot annealed. Thus far the maximum variation from the mean deformation value has been only 1.3 per cent, which is less than the other errors involved in the experiment.

A 3-ton truck with solid rubber tires was used in the experiments. This truck weighs 11,400 pounds empty, the weight on each rear wheel being 3,425 pounds, while the weight of the unsprung rear parts is 3,675 pounds on both wheels. The deflection of the rear spring under the weight of the body alone is 0.74 inch, while when loaded with 3.6 tons of gravel the deflection is 2.62 inches, and when loaded with five tons it is 3.62. The diameter of the rear wheels is forty inches. Each rear wheel is fitted with two solid rubber tires, each six inches wide at the base next to the rim.

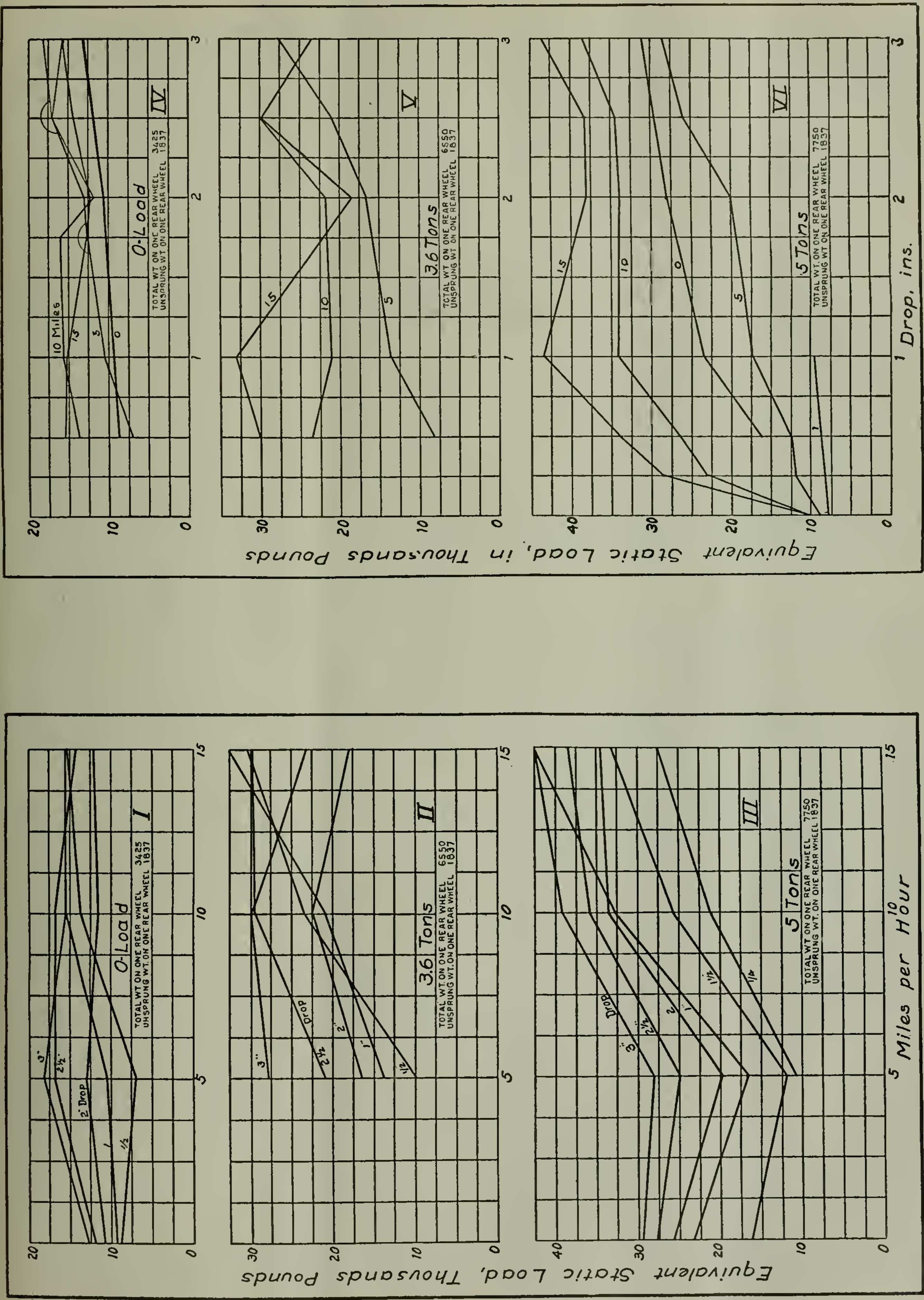
#### THE TEST CONDITIONS.

Tests were conducted with height of drop varying from ¼ to 3 inches. The magnitude of the impact is dependent upon the height of drop, weight of truck and load, the kind and condition of the tires, the characteristics of the spring, and the speed of the truck.

The impact is noted in terms of static load which would produce the same compression in the copper cylinders. This may not be a perfect comparison of impact loads, as loads applied with impact will probably produce a much localized effect which does not result from the application of an equivalent static load. For this reason the present methods of comparing impacts by their equivalent static loads must be considered as tentative and subject to possible revision as the tests proceed. These tests, therefore, do not attempt to demonstrate the destructive effect of these impacts; but this effect depends upon the road surface, the type of construction, and the foundation, as well as upon the force of the impact, and it is proposed in another series of experiments to subject certain road surfaces to these same impacts repeatedly until failure occurs.

#### RESULTS OF TESTS.

The results of the tests already made are shown in the accompanying diagrams. Diagrams I, II, and III indicate that there is a general tendency of increased impact with the higher speeds, although the relation between speed and impact is not constant. The relatively high impact values at zero speed shown in diagram III are explained by the fact that the results were obtained by dropping the wheel vertically upon the impact plunger, which resulted in the copper cylinder receiving first the impact or kick of the spring, and an instant later an additional load from the falling of the truck body and load. Diagrams IV, V and VI show the same data plotted with the height of drop as abscissas. They indicate a general increase of impact with the increase of height of drop.



DIAGRAMS SHOWING RESULTS OF TESTS ON IMPACT OF MOTOR TRUCKS ON ROADS.

In conducting the experiments it was soon discovered that the action of the truck springs had a great influence on the impact results. When the wheel leaves the jump-off point, the spring snaps open and produces a greater downward acceleration of the unsprung part than that due to the action of gravity alone. If the period of vibration of the spring is such that it has acquired its maximum downward acceleration at the instant that the wheel strikes the road surface, the impact value will be a maximum; while if the spring is returning to its closed position and is at the point of maximum acceleration in this direction as the impact occurs, the impact value will be a minimum. The latter appears to be the condition shown in diagrams IV and V for a 2-inch drop with speeds of ten miles and fifteen miles respectively. It will be noticed that the static loads equivalent to the impact values under the higher loads and drops reach as high as five times the total dead load.

It was also noticed during the tests that the impact was appreciably affected by the condition as to whether the motive power was on or off, the impact being less when coasting than when power was being applied to the rear wheels, the difference amounting in some cases to as much as 30 per cent.

It is hoped that these tests, extended to include the effect of character of road and other conditions previously referred to, will ultimately result in definite data which can be used in road design, and also lead to the establishment of rules and laws for allowable loads and speeds of auto trucks, and possibly furnish an equitable basis for license fees.

## RECONSTRUCTING MADISON'S WATER WORKS.

### New Pumping Station and Larger Plant Built on the Site of the Old Without Interrupting Service —New Reservoir and Air Lift.

Madison, Wis., is now using a reconstructed water works plant, the installing of which was performed with some difficulty, due to the necessity of maintaining the old plant in operation meantime, both old and new plants occupying the same site. The same conditions have obtained in a number of reconstructed plants, but each probably presents some difficulties peculiar to itself.

The original water works system was constructed in 1882, when the population of Madison was about 10,000. The supply was obtained from eight artesian wells having an average depth of 750 feet and drawing water from the Potsdam sandstone. This water contains about 30 grains of lime and magnesia per gallon, which is an objectionable feature. Originally the water rose above the surface and flowed to the pumps by gravity, but in 1904 the increased draft necessitated the installing of deep-well pumps, followed by the construction of a 200,000 gallon reservoir used as a suction well, and later by a reservoir of 1,000,000 gallons capacity. In 1914 an air-lift system was installed in four of the wells. The original pumping plant consisted of one 1,500,000-gallon and one 2,500,000-gallon power pump, each driven by a Corliss engine. In 1911 two compound, condensing, duplex pumps of 1,500,000 gallons and 3,000,000 gallons capacity respectively were added.

In 1885 the amount of water pumped averaged 546,000 gallons a day, which had by 1914 increased to 2,270,000 gallons, with a maximum daily use of about 3,000,000. During the past few months the average daily use of water has reached 3,300,000 gallons, while the average for the month of greatest demand was about 3,500,000 and the maximum amount pumped in any one day was 4,000,000 gallons, a maximum rate of 7,500,000 gallons having been reached.

In 1914 the city officials began planning an improvement in the supply and engaged consulting engineers to advise on the same. The new works recently completed were designed by Daniel W. Mead and Charles V. Seastone. The general contractors on the work were Morgan & Morgan and George Nelson, both of Madison. The superintendent of the plant is L. A. Smith, who has occupied this position since 1916, having for four years previous been largely in charge of the works as assistant city engineer.

In designing the new plant a number of plans were considered. The obtaining of a supply from Lake Mendota, which was located within 500 feet of the pumping station, was considered. This water is softer than the well water and its use would avoid double pumping, and the amount of water available is more than any anticipated demand; but continuous filtration and chlorination would be necessary, and the popular prejudice against this caused the city council to decide to continue the use of artesian water.

A new site also was considered, which would be more convenient to the railroad whereby coal is obtained, and a new plant and station could be built more cheaply on a new site than in and around the existing plant and station. On the other hand, the city would have to purchase a new site, the existing wells would have to be abandoned, and the distribution system had been laid out with reference to the existing location and a change in location would necessitate expensive changes in the mains. It was therefore decided to use the existing site and to continue the use of artesian water.

Three new 200 h.p. water-tube boilers were installed, equipped with elevated concrete coal bunkers, coal and ash-handling machinery, and a new stack six feet in diameter and 150 feet high, built with radial blocks. A new 8,000,000 gallon high-duty pumping engine was installed for continuous service, the two horizontal, compound pumps and the vertical pumping engine being retained as service units. The motor-driven air-compressor plant and temporary air-lift plant and the deep-well pumps were removed and in their places were installed three steam-driven air compressors, while air-lift pumps were placed in the ten wells that furnished the enlarged supply. A concrete reservoir of 1,500,000 gallons capacity was built adjacent to the existing reservoir and connected with it. The water from the artesian wells is pumped by air lift into these reservoirs, from which it flows to the suction wells and is pumped by the high-pressure pumping engines into the distribution mains.

In beginning the reconstruction, a temporary wooden building was erected over the pumping machinery to protect it from dust and falling material, and the old building (with the exception of the boiler room) was then torn down and the construction of the new building begun. The new building is larger than the old and the foundations were outside of those of the old building. At the same time the new stack was erected.

The new boiler room was built around the old one, and when one end of it had been completed, two new boilers were installed and were placed in service as soon as the steam pipe connections had been made for carrying the station load. The old boilers were then dismantled, the old chimney torn down and the remainder of the new boiler room was completed. This permitted the construction of a third new boiler and provided space for two additional boilers in the future.

When the new pump room had been completed, including the roof, the temporary wooden building around and over the pumps was removed and the new pumping engine was erected and placed in commission. When this was operating satisfactorily, the old 2,500,000-gallon duplex, geared pump and the old air-compressor plant were removed to make room for the three steam-driven air compressors provided for the new air-lift system. The vertical and the two compound pumps were allowed to remain in a temporary pit which was provided for that purpose, but ultimately will be replaced by new machinery at the same elevation as the new pump when the capacity of the plant shall need to be increased.

In connection with installing this machinery, it was necessary to transfer the high-pressure steam piping to a new header, change the suctions from the old suction wells to the new ones, and connect the discharge pipes from all the pumps into a common 30-inch header in the pipe gallery.

The new boilers carry a steam pressure of 150 pounds and the normal water pressure at the pumping station is 85 pounds. This water pressure is considerably greater than is found in many cities of Wisconsin because of the greater difference in elevation of the different parts of the city. A maximum fire pressure of 125 pounds is provided for.

The new air-lift system, when tested, developed a capacity of about 7,500,000 gallons per day and it is believed that the wells will furnish a continuous supply of 6.500,000 gallons, to which can be added the 2,500,000 gallons in the storage reservoirs in case of fire. At present, one boiler furnishes all the steam necessary, but a second is always kept with fire banked as a precaution for fire service, while the third boiler is provided to permit cleaning or repairs of one of the other two.

In designing the layout of both steam and water piping, care was taken to prevent, as far as possible, any crippling of the plant by accident. No single break can prevent more than one pump from discharging into the mains, nor can any one break in the mains shut off the city from an adequate supply of water; while no break in the steam piping can place more than one pump out of service. The old pumps retained in the plant can furnish an adequate supply should the new pump be out of service for any reason, and the air-compressor plant is in duplicate. The amount of water available is calculated to be sufficient to furnish continuous fire service of twenty-one fire streams for twenty-four hours, or thirty fire streams for twelve hours, in addition to the regular consumption.

## COST OF LAYING WATER PIPE.

In the present condition of prices and costs, old records are of little value and the latest data are especially useful. The following itemized costs from Rome, N. Y., and Canton, O., refer to recent work.

In Rome water pipe was laid in trenches 6 feet deep, all 6-inch pipe except one job. The 6-inch pipe used in three jobs cost $60 per ton, and that used in four others cost $47.60, while the 4-inch cost $51.60.

Trenching, back-filling and caulking 6-inch pipe cost as follows: Gravel soil, 150 ft. laid, with three-way, offset and plug, $1.37 per foot. Clay soil, 456 ft. laid, with three-way and sleeve, 77 cts.; 266 ft. laid, with three-way and two plugs, 92 cts.; 139 ft. laid, 90 cts. Stone and loam soil, 218 ft. laid, with increaser and plug, 62 cts.; 130 ft. laid, 99 cts.; 97 ft. laid, 73 cts. The 4-inch pipe, 44 ft. laid in gravel and filling, cost $1.72 per foot, this involving a cross, two reducers, two plugs and two sleeves.

In Canton, bids for 1,156 feet of 6-inch water main, in connection with a paving contract, varied from $1.75 per foot to $2.02; and those for 65 feet of 4-inch main, from $1.74 to $1.90. Bids for fire-hydrants furnished and set were $65 and $100; and for resetting fire-hydrants, $1 to $10 each.

## MUNICIPAL MARKETS.*

### Products Sold in the Several Markets—Sizes of Markets—Rental Charges in Open and Inclosed Markets.

PRODUCTS SOLD.

In certain municipal markets, dealers are limited to specified lines, in some cases being limited to the sale of local country produce, in others, restrained from selling meat, fish or other commodities. Markets in which the sale is confined to vegetables and other farm products are Gansevoort and Wallabout wagon markets in New York, all markets in Philadelphia, two markets in Cleveland, one in Pittsburgh, one in Washington, one in Seattle, one in Indianapolis, and one in Toledo. Meats and poultry are prohibited in one market in Chicago; meats are prohibited in San Antonio, Utica, Dubuque, Niagara Falls and Columbia, S. C. (some of these specifying fresh meats only); meats and fish are prohibited in one market in Cincinnati, Lynn, Mass., Evansville, Ind., Passaic, N. J., and Lancaster, Pa. Four Wilmington, Dela., markets prohibit the sale of bread, cake, ice-cream, confections and essences, while of three others, one in limited to fresh fish, another to flowers and plants, and the third to fruits and grains. One market in Pittsburgh is limited to fruits and vegetables sold by the producers. The Hartford market is limited to fruit, vegetables and garden produce, poultry, eggs and butter. The Springfield, Mass., market is limited to the sale of products grown in Hampden county. The market in Altoona prohibits the sale of butter, milk and meats, and that in Quincy the sale of butter, eggs and poultry.

Of the inclosed markets, one of Philadelphia is limited to meats, and another to meats, butter and eggs. One in Baltimore and one in Washington is limited to sea-food. In all Buffalo inclosed markets the sale of tea, coffee, spices, etc., is prohibited, while in one Columbus market the sale of groceries except tea and coffee is prohibited and in two other markets the sale of all groceries is prohibited. The sale of fish is prohibited in two Cincinnati markets, in the Lancaster market and the Wheeling market. In the Lynchburg market the sale of flour is prohibited. In many of the markets where fish is permitted to be sold, it is required that this be done at stalls not in close proximity to stands where other food products are sold, some requiring such sales to be made in stands outside of the neighboring inclosed markets. However, six cities report seven markets in which the fish stalls are not separated from the others. Of the 7,512 stands reported as used in inclosed markets during the fiscal year, about one-third were for the sale of fruits and vegetables and about the same number for the sale of meats and poultry.

SIZES AND RENTAL CHARGES

Of the open municipal markets reported, 127 are for retail business only, 16 for wholesale business only, and 37 for both kinds. Of the inclosed markets, 76 are for retail business only, 3 for wholesale only, and 17 for both.

A number of cities do not report the areas covered by the open markets or the linear feet of curb used, possibly in most cases because these are indefinite; but there were reported 3,976,836 sq. ft. of area inside property lines, 1,183,467 sq. ft. covered by sheds, and 103,778 lin. ft. of street curb used. In the open markets 17,578 open-air standing spaces were reported, and 8,238 under sheds; but 24 cities failed to report either.

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*Concluded from page 148.

In the inclosed markets are 2,110,595 sq. ft. covered by the buildings. The buildings contained 7,512 stands, of which 6,519 were occupied during the year. The stands and spaces behind the same vary greatly, 3 by 5 being the smallest, and the largest being 25 by 108 and 20 by 135. The majority lie between 5 by 8 and 20 by 30.

The charges for space vary as widely as the areas, but by no means in proportion therewith. For daily charges in open markets, 10, 15 and 25 cents are common, although Newark charges 50 cents to $1.50; New Orleans 15 cents to $100 in one market and 25 cents to $3.50 in another. In 35 open markets there is no charge, and in 3 no charge to producers. A number lease the spaces by the year, the rates varying from $5 to $50. Several others lease by the month, some by the quarter-year, half-year, or season.

In the inclosed markets, the stands are generally rented by the month, quarter-year, half-year, or season; but New Orleans, Syracuse, Pittsburgh (one market), Roanoke (one market), and Madison, Wis., charge by the day. New York rents by the week in two of its markets. The prices vary greatly. In New York alone they range from $76 to $2,619 a year, although the area of the latter is but about 50 per cent greater than that of the former. In Baltimore the range is from $25 to $400 a year, the latter having four times the area of the former, but being for the sale of fish, while the smaller is for flowers. The highest charge is in Pittsburgh, $2,832 a year for a stand 14 by 29 feet. The lowest charge is $15 a year, made by Covington, Ky., and Norristown, Pa.

## LITTLE ROCK-HOT SPRINGS HIGHWAY CONTRACT.

The bulletin of the Associated General Contractors for August 30th contains a letter from secretary G. W. Buchholz, dated August 28th, the object of which is to give wide publicity to a contract let by the Board of Commissioners of the Little Rock-Hot Springs Highway.

This letter states that the board advertised for bids to be received until 2 p. m., May 14, "when they will be publicly opened and read"; that five formal bids were opened and read; but that on the following day the board announced that there were not enough funds to perform all the grading and paving contemplated and that a contract for the grading alone had been let to a firm that had not bid formally at all. Mr. Buchholz says:

"In justice to the contractors, who devoted their time and money to studying the contemplated work and making up a proposal and in obtaining necessary bid bonds, and who had complied with the conditions set down in your notice to contractors, the incomplete prices submitted by the Oliver Construction Company should never have been considered."

The secretary at the same time presented the case to the director of the Bureau of Public Roads, the state highway engineer of Arkansas, and bankers interested in the bidding; also to the members of the Associated General Contractors. "It is one of the fundamental purposes of the A. G. C. to make it impossible for such practices to be followed in the future without incurring the widespread condemnation of responsible public officials, as well as contractors who suffer as a result of them."

During the interval since this letting, the A. G. C. has been gathering evidence and thoroughly investigating the circumstances, and endeavoring, unsuccessfully, to obtain a statement from the Oliver Construction Company.

# METER MAINTENANCE

### Cost of Repairing and Maintaining Meters in American Cities—Intervals at Which Meters Are Tested and Methods of Testing—Repairs Which Are Made by Water Works Employes.

This table completes the presentation in tabular form of information collected by Municipal Journal from and for water-works officials, the first of which appeared in the June 7th issue. A table in that issue similar to this gave data from 510 cities, while in this issue are given data from 132 more—a total of 642 cities.

One feature of these returns is the comparatively few cities that test meters at regular intervals. A considerable number test them only "when thought necessary" or when the readings vary considerably from previous ones. Where tested at regular intervals, these lie generally between 2 and 10 years, although some test the large meters more frequently.

## METER MAINTENANCE.

| City and State | Cost of repairs and maintenance per meter in service | Repairs made by water works | Intervals at which meters are tested | Meters not tested periodically, but | Are any tested without removal? | Method of such testing. |
|---|---|---|---|---|---|---|
| **Alabama:** | | | | | | |
| Mobile .......... | ........ | All | ........ | By application of consumer or dept. auditors | Yes | Measuring tank |
| **Arkansas:** | | | | | | |
| Jonesboro ....... | 8c. per year | All | Annually | ........ | Yes | Disconnecting from house side and using container |
| **California:** | | | | | | |
| Eureka .......... | 2.25c. per month | All | ........ | Whenever time permits | Yes | Test meter |
| Ontario ......... | 18.2c. | All | 5 years | ........ | Yes | Mueller tester |
| Pacific Grove and 4 other municipalities ....... | ........ | All | 4 years | ........ | No | ........ |
| Pomona ......... | ........ | All | ........ | When defective | No | ........ |
| San Francisco.... | 40c. per year | All | ........ | Upon complaint | Yes | Calabrated tank |
| Santa Rosa ...... | $30 per month on all | All | ........ | First bill over $1.00 | All | Test meter |
| **Colorado:** | | | | | | |
| Longmont ...... | ........ | All | ........ | When deemed necessary | Yes | Trident test meter |
| **Connecticut:** | | | | | | |
| Bristol .......... | 45c. last year | ⅝-in. and 1-in. meters | ........ | When they go slow | At times | National Meter Co. tester |
| New Britain ..... | ........ | All except discs and gearings | As readings indicate | According to use | No | ........ |
| New London .... | 54c. last year | All | ........ | Doubtful registration | No | ........ |
| Windsor ........ | $3.50 | All except freezing | Large meters yearly | Variation in consumption | Yes | Portable test meter |
| **Florida:** | | | | | | |
| Daytona ........ | ........ | All | ........ | ........ | Rarely | Portable test meter |
| Orlando ......... | ........ | All | ........ | When running slow | No | ........ |

## METER MAINTENANCE (Continued).

| City and State | Cost of repairs and maintenance per meter in service | Repairs made by water works | Intervals at which meters are tested | Meters not tested periodically, but | Are any tested without removal? | Method of such testing. |
|---|---|---|---|---|---|---|
| **Idaho:** | | | | | | |
| Boise | 38½c. | All | When necessary | Variation in consumption | Yes | Portable test meter |
| Weiser | ........ | All | When necessary | Complaint, removal or small register | Yes | Portable standard |
| **Illinois:** | | | | | | |
| Elgin | About $15 monthly | All | ........ | ........ | No | ........ |
| Freeport | ........ | 95% | According to Utilities Comn. | ........ | Very few | Special device |
| Kankakee | ........ | All | Annually | ........ | No | ........ |
| Rock Island | ........ | ........ | When necessary | When necessary | No | ........ |
| Springfield | 31c. | All | ........ | Unusual consumption, frozen, etc. | Yes | Portable test meter |
| **Indiana:** | | | | | | |
| Batesville | ........ | All | ........ | When they fail to register | No | ........ |
| Elwood | ........ | None | ........ | ........ | .... | ........ |
| Indianapolis | ........ | All | Large, every 5 or 6 years; small, every 8 or 10 years | ........ | No | ........ |
| Lafayette | ........ | All | ........ | When stopped or on complaint | No | ........ |
| Marion | ........ | All | ........ | Irregular readings or request | No | ........ |
| New Albany | 97c. per year | 95% | Semi-annually | ........ | Yes | Tee placed on outlet with plug that test can be attached |
| Richmond | ........ | All except some frozen | 5 years | ........ | No | ........ |
| Union City | ........ | Nearly all | ........ | Length of time in use | No | ........ |
| **Iowa:** | | | | | | |
| Albia | Done by engineers | All | ........ | Unsatisfactory registration | Yes | Weight of water |
| Council Bluff | 37c. | All | ........ | By readings | No | ........ |
| Creston | ........ | All | ........ | ........ | No | ........ |
| Fairfield | ........ | All | ........ | ........ | Yes | Test meter |
| Iowa City | ........ | 90% | ........ | Stoppage or suspicious readings | No | ........ |
| Osage | ........ | All | ........ | Stoppage or suspicious readings | No | ........ |
| Oskaloosa | $1 per year | All | Annually | Unsatisfactory rates | No | ........ |
| Vinton | 80c. per year deep well meter | All | ........ | ........ | Some | Measuring |
| **Kansas:** | | | | | | |
| Newton | ........ | All | ........ | Unusual bills or no registration | No | ........ |
| Olathe | $1 | None | ........ | When out of order | .... | ........ |
| Pittsburg | ........ | All | Semi-annually | ........ | No | ........ |
| Topeka | 49c. | Internal repairs | ........ | As occasion requires | No | ........ |
| Wellington | ........ | 90% | ........ | ........ | No | ........ |
| **Kentucky:** | | | | | | |
| Richmond | ........ | All | Annually | ........ | No | ........ |
| **Louisiana:** | | | | | | |
| Alexandria | 50c. per year | All | ........ | When registration fails to average | Some | Measurement |
| Baton Rouge | ........ | All | ........ | Decrease in bill, etc. | No | ........ |
| **Maine:** | | | | | | |
| Calais | Very small | None | When necessary | When they stop or have been running long | No | ........ |
| **Massachusetts:** | | | | | | |
| Athol | Slight | ........ | At convenience | ........ | No | Neptune meter tester |
| Brockton | 75c per year | All | At least every 4 years | ........ | Yes | Lambert test meter |
| Framingham | $1,139.96, total; no labor | All | Uncertain | When running fast or slow or when convenient | Yes | Portable testing meter |
| Haverhill | 59c, or $1,879 total | Nearly all | ........ | As deemed necessary | No | Testing machine |
| Milbury | ........ | Small repairs | ........ | When deemed necessary | Yes | Tank |
| Medway | ........ | None | ........ | ........ | .... | ........ |
| Monson | ........ | Meters less than 1 in. | ........ | When leaky or running slow | No | Fort meter tester |
| North Adams | ........ | Simple repairs | No regular time | When deemed necessary by consumer or supt. | No | ........ |
| Oxford | ........ | ........ | ........ | ........ | Some | ........ |
| Spencer | 15c in 1918 | 75% | ........ | Readings | .... | ........ |
| Turner's Falls | ........ | All | Semi-annually | ........ | No | ........ |
| Winchester | ........ | All | 4 years | ........ | No | ........ |
| Winthrop | Very small | Over two-thirds | Intend to every 3 years | ........ | No | ........ |
| **Michigan:** | | | | | | |
| Ann Arbor | ........ | All | On request | Suspicious readings | No | ........ |
| Marquette | ........ | All | 3 years | Length of time in service | No | ........ |
| Paw Paw | Light | All | ........ | ........ | .... | ........ |
| **Minnesota:** | | | | | | |
| Moorhead | 20c to 30c | 85% | Annually | ........ | Both | Scale and flow |
| Willmar | ........ | Nearly all | ........ | When slow | Yes | Proving meter and weighing |
| **Missippi:** | | | | | | |
| Tupelo | $10.50 per mo. | All | ........ | When complaint is made | No | ........ |
| **Missouri:** | | | | | | |
| Fulton | ........ | All | No systematic testing | When deemed necessary by consumer or supt. | Yes | Cu. ft. measure |
| Washington | ........ | Minor repairs and cleaning | ........ | ........ | No | ........ |
| **Montana:** | | | | | | |
| Bozeman | 95c | None | Annually | When occasion demands | No | ........ |
| Deer Lodge | ........ | ........ | Semi-annually | ........ | No | ........ |
| Glendive | ........ | ........ | On request | When total dial capacity is passed | Under 1-in. | Rotating standard |
| **New Hampshire:** | | | | | | |
| Dover | ........ | 75% | ........ | When requested by owner | No | Weight |
| **New Jersey:** | | | | | | |
| Dover | ........ | All | Not less than 2 years | Consumer's complaints of excessive bills | No | ........ |
| **New Mexico:** | | | | | | |
| Raton | ........ | City work | Quarterly | ........ | All | Testing bucket |

## METER MAINTENANCE (Continued).

| City and State | Cost of repairs and maintenance per meter in service | Repairs made by water works | Intervals at which meters are tested | Meters not tested periodically, but | Are any tested without removal? | Method of such testing. |
|---|---|---|---|---|---|---|
| **New York:** | | | | | | |
| Binghamton ..... | 5c | All | 5 years | Irregularity in readings | No | ........ |
| Carthage ........ | Kept in repair by customers | None | ........ | ........ | Yes | Buffalo meter tester |
| Cortland ........ | ........ | All | ........ | Suspicious registration | No | ........ |
| Glens Falls...... | ........ | All possible | ........ | Apparently incorrect registration or consumer's complaint | No | ........ |
| Hempstead ...... | ........ | Nearly all | When meters are read | ........ | No | ........ |
| Homer .......... | Light | All | ........ | When out of order | Yes | Gallon measure |
| Jamestown ...... | ........ | 90% | ........ | When counter has gone around | No | ........ |
| Kingston ....... | ........ | All | No regular intervals | ........ | No | ........ |
| Oneonta ........ | ........ | ........ | ........ | Unusual readings | .... | ........ |
| Oswego ......... | $1.25 | All | Semi-annually | ........ | No | ........ |
| Waterloo ....... | ........ | All | ........ | When necessary as shown by readings | No | ........ |
| **North Carolina:** | | | | | | |
| Durham ......... | ........ | ........ | When installed | On consumer's request | No | ........ |
| Newbern ........ | ........ | All | ........ | Irregularities in consumption | Yes | Test meter |
| Oxford .......... | ........ | ........ | ........ | Customer's request | No | ........ |
| Raleigh ......... | ........ | All | Annually | ........ | No | ........ |
| **North Dakota:** | | | | | | |
| Mandan ......... | None | None | No certain time | When radical change in bill | No | |
| Valley City...... | ........ | All | When necessary | When consumption falls of | No | ........ |
| **Ohio:** | | | | | | |
| Barberton ....... | ........ | ........ | ........ | Consumer's complaint | No | ........ |
| Defiance ......... | Very light | Choked meters | When irregular | Stoppage or unusual report | Yes | Test meter |
| Middetown ...... | 51c | All | ........ | Stoppage or consumer's complaint | No | ........ |
| St. Marys........ | 30c | ........ | ........ | Complaint | No | ........ |
| Toledo .......... | ........ | All | ........ | Stoppage | No | ........ |
| Wauseon ........ | 80c | Nearly all | ........ | Low registration | No | ........ |
| **Oklahoma:** | | | | | | |
| Tulsa ........... | ........ | All | On request | Complaints or suspicion | No | ........ |
| **Oregon:** | | | | | | |
| La Grande....... | ........ | All | No regular intervals | When found inaccurate | No | ........ |
| **Pennsylvania:** | | | | | | |
| Ambler ......... | ........ | All except bad frozen | 5 or 8 years | When brought to shop for repairs | Some | Portable test meter |
| Emporium ...... | ........ | All | ........ | ........ | .... | ........ |
| Ford City........ | ........ | All | ........ | Irregular readings | Yes | New meter |
| Franklin ........ | ........ | All | Semi-annually | ........ | No | ........ |
| Hanover ........ | ........ | Returned to factory | ........ | When found inaccurate, shown by readings | Yes | 5-gal. bucket |
| Lansford ........ | $1.46 | All | ........ | ........ | No | ........ |
| Lehighton ....... | 38c average annually | Wear and tear repairs | 18 months | ........ | Yes | Accurately measured can and weight |
| Morristown ..... | ........ | All except 2-in. and over | Public service rules | ........ | No | Weight |
| Oil City.......... | ........ | All except over 1-in. | Quarterly and on request | ........ | No | West Meter Co. testing machine |
| Pottsville ....... | ........ | None | ........ | ........ | Yes | Test meter |
| Reading ........ | 12.4c | All | ........ | Stoppage or unusual registration | Yes | Test meter and hose |
| Wellsboro ...... | ........ | Usually sent to maker | Annually | ........ | No | ........ |
| **Rhode Island:** | | | | | | |
| Providence ...... | ........ | Ordinary | ........ | Stoppage, or abnormally low registration | No | ....... |
| **Sonth Dakota:** | | | | | | |
| Mitchell ......... | ........ | All | When necessary | By size of bill | No | ........ |
| **Texas:** | | | | | | |
| Amarillo ........ | 50c. per year | All | ........ | When brought to shop or customer's request | Yes | 5 and 10-gal. cans |
| Austin .......... | 41c. per month | All | ........ | When reported by meter readers | Yes | Can |
| Dallas .......... | 6.47c. | All | In future every 1½ to 2 years | On consumer's request | No | ........ |
| El Paso ......... | 7.8c. (April) | All | At least once a year | ........ | Yes | Testing machine |
| Galveston ...... | ........ | All | ........ | Complaints of high bills | No | ........ |
| McKinney ....... | ........ | All | ........ | Stoppage | No | ........ |
| Taylor .......... | $1.30 in 1918 | All | Semi-annually | ........ | Yes | 10 gal. U. S. measure |
| Vernon .......... | Probably $50 (no record) | All | ........ | Stoppage | No | ........ |
| Waco ........... | ........ | All | Take it by streets | ........ | No | ........ |
| **Vermont:** | | | | | | |
| Bennington ..... | Owners repair | None | ........ | When necessary | No | ........ |
| Essex Junction... | ........ | All | ........ | ........ | No | ........ |
| **Virginia:** | | | | | | |
| Charlottesville .. | About $300 per year | Nearly all | ........ | Irregular registration | Some | Portable tester |
| **Washington:** | | | | | | |
| Auburn ......... | 10c. per month | All | ........ | When register is not uniform | Yes | Test meter |
| Bellingham ..... | ........ | All | As often as possible | ........ | No | Test meter |
| Winlock ........ | Very small | Practically all | Close personal observation | When reading shows unusual large or small consumption | Yes | Test meter |
| **West Virginia:** | | | | | | |
| Fairmont ....... | 46c. | Practically all | 4 year | When deemed necessary and on complaint | Yes | Hand test |
| **Wisconsin:** | | | | | | |
| Two Rivers ..... | Owned by consumers | Repaired by consumers | ........ | ........ | .... | ........ |

# The WEEK'S NEWS

**Indianapolis Has Laid Out a State Highway System of Approximately Three Thousand Miles — Highway Work Under Way in New Hampshire and Texas—Studies of Arkansas Water Supplies—Water Rates Increased in New Jersey—Ordinance Requiring Cleaning of Privies Declared Valid—Right to Quarantine Venereal Cases—Traffic Regulation in New York and Pennsylvania.**

## ROADS AND PAVEMENTS

### State Road System Laid Out.

Indianapolis, Ind.—A tentative system of approximately 3,000 miles of roads that will probably be designated as a part of the state highway system has been laid out by L. H. Wright, director of the state highway commission. A map of the proposed system has been turned over to the state board of tax commissioners for the guidance of the board in its consideration of county road building programs. The tentative system embraces the system laid out by the old highway commission. That system included the Range line road from Indianapolis north to South Bend; the Louisville road, from Indianapolis south through Seymour to Jeffersonville; the National road, east and west from Indianapolis to the state lines; the Lincoln highway, east and west across the north end of the state; the Vincennes-Lawrenceburg road, east and west across the south end of the state, and the French Lick trail, from Mitchell southwest through Huntingburg to Evansville. The "main market highways," as the old system was known, divided the state into four principal sections. The Range line road and the Indianapolis-Louisville road were the dividing lines for the east and west halves and the National road for the north and south halves. The new state highway commission law requires the commission to designate before April 1, 1920, a system of roads to include each county seat in the state and each town of more than 5,000 population. Mr. Wright believes that the commission will be able to designate the system by some time in January. When the state commission designates the roads and takes them over it will maintain them thereafter. Mr. Wright estimated that it will take six or eight years to complete the improving of the entire system.

### Highway Progress in New Hampshire.

Concord, N. H.—The state highway commission is having the busiest season since its organization. Four new state highways are to be added to the system which New Hampshire now has, and some changes are being made in existing highways. The new lines are connections between existing state highways, designed to serve the needs of communities not heretofore reached and also to make cutoffs between important centres which are reached by more than one main road. Work is now going on under the direction of the highway commission, in forty "state aid" towns, twenty trunk line towns and thirty-seven "federal aid" towns. There has been a dearth of road labor this summer, owing to the fact that much of the labor—estimated as high as twenty-five or thirty per cent—which has been employed on the state road work, has been engaged in haying, the high price paid by farmers in order to get their crop being so attractive that it took many away from road jobs. As haying in New Hampshire is now practically over, much of this labor will return to the roads for the remainder of the season. Practically all of twenty towns on the cross state lines or trunk lines in New Hampshire system will receive federal aid this year. With the amount appropriated this season and the balance from last year, there is about $600,000 available from the federal government, and this must be met by an equal amount from the towns, so that the state will have $1,200,000 to spend this year. There were more applications for state aid for road making this year than ever before, 197 towns having applied for it. The term "state aid" as here used means work on either trunk lines, supported by the state, federal aid lines, of which the government bears half the expense, or state aid roads, of the cost of which the towns pay half and the state the other half. New Hampshire has appropriated $500,000 and the towns $250,000 to be spent on state and trunk lines. In addition there is $300,000 of state and town moneys to be applied strictly to state aid construction.

### Texas Busy in Highway Construction.

Austin, Tex.—Construction work is now under way in 37 counties in Texas on a dozen different highway projects, some of them of considerable importance to the development of tourist travel. Of special note is the fact that the work on highway No. 1, the Bankhead National, Texarkana to El Paso, is being pushed. This is a highway which will carry much transcontinental travel. The counties where work is going on include Aransas, Baylor, Bell, Bexar, Brooks, Caldwell, Cherokee, Colorado, Comel, Culberson, Dallas, Dickens, Falls, Fayette, Fisher, Foard, Freestone, Gonzales, Gregg, Harris, Hemphill, Jasper, Nolan, Randall, Runnels, San Augustine, Scurry, Schakelford, Taylor, Travis, Val Verde, Van Zant, Ward, Wheeler, Wilbarger, Williamson and Wise. The present plan of the state highway department with reference to the expenditure of money out of the special highway fund in a county contemplates that it shall first be spent upon designated highways; then upon intercounty highways; and not until it has been ascertained that the designated state and intercounty highways are being properly maintained may the commissioners expend any of this money upon either highway; and then only upon the approval by the highway department. Salary of the county engineer, whether regularly employed or as an expert, may be made from the special road fund only for the actual time employed upon designated state roads. The state highway law provides that the collector shall deposit in the county depository to the credit of the special highway fund one half of the gross registration chauffeur or transportation fees collected in his county; this special fund is to be spent under the direction of county commissioners in the maintenance of public roads only and for no other purpose; and such expenditure must be within the rules prescribed by the state highway department, of which two are given above. It is held, under the above citation, that any commissions paid the county treasurer shall be from the county funds and not from the special road tax. According to R. M. Hubbard, chairman of the state highway commission, "the commission has allotted aid to the various counties in the state totaling the sum of $15,959,000 in federal aid and approximately $2,500,000 state aid for the construction of highways. This money has been divided among approximately 160 counties, and embraces alone every conceivable type of road which is recognized as being satisfactory. Probably the largest project now under construction under the supervision of the department is the Dallas-Fort Worth highway, comprising about nine miles of twenty-foot concrete road. This highway will cost approximately $42,000 per mile to construct. In some of the West Texas counties, particularly in Ward, Fisher and Mitchell Counties, we have roads which will not cost more than $2,000 per mile to construct, believing that these will be satisfactory to carry the traffic which will use them. An unusual condition has manifested itself, however, in many of the West Texas counties, which was wholly unexpected two years ago. This is due to the great oil development that has taken place in that section of the state. In Wichita County, for instance, it was contemplated to construct a gravel road to Wichita Falls, and, in fact, construction work had started when it was discovered that this would be totally inadequate for the traffic conditions. Work was, therefore, stopped, and the county has now voted a $2,000,000 bond issue so as to change the type of this road. It is now contemplated to construct sixty miles of concrete road. As a general rule a minimum width of sixteen feet of surfacing is desired, and unless exceptional conditions develop it is necessary that sixty feet right of way be procured. In all cases we have been insisting upon permanent drainage structures, believing these to be an investment which will bring the greatest returns for the money spent. In recent months, due to the enormous expansions in road construction, the material situation has been giving us considerable trouble. To somewhat allay this situation and with an endeavor to solve it we have decided to make a general materials survey of the state looking toward opening up more deposits. Private capital has been somewhat loath to enter into this phase of the matter, as the materials business has, up to this time, not been very remunerative. In a number of instances counties have procured the quarry outright or have contracted the entire output."

## WATER SUPPLY

### U. S. Public Health Service Makes Water Supply Studies.

Little Rock, Ark.—The United States Public Health Service has sent sanitary engineer S. Pincus to co-operate with the state board of health in an investigation of the public water supplies of the state. Since federal regulations require that all drinking water supplies furnished to railroads must be certified as to their sanitary purity, the government has temporarily detailed the engineer to assist the state board of health to conduct extended examinations of these water supplies. The investigation will be jointly carried on by M. Z. Bair, chief engineer of the state board of health and S. Pincus, associate sanitary engineer of the U. S. Public Health Service. A list of the public water supplies of the state is now being compiled, and as soon as completed, visits for field survey and laboratory examinations will be commenced. The field survey of each supply will include a careful inspection of the suitableness of the location for the type of water supply, the inspection of environment with respect to dangers of pollution of the supply, and finally a study of the construction and operation of the waterworks system. Samples will be collected for bacteriological examination as to evidence of dangerous contamination. Each supply will then be approved or refused recommendation for federal certification for use on railroad lines. Suggestions and recommendations for improvement will, however, be made in every instance of a supply not proving of satisfactory sanitary condition. This proposed plan will require extensive work and on account of the studies, all having to be personally made by the engineers, it will not be possible to reach each town supply as soon as desired. It is confidently believed that this investigation will result in greatly improving the quality of the water supplies, not alone those in use by the railroads, but of all public water supplies in the state. It will also mark the commencement of a routine control and supervision by inspection visits and laboratory analyses of the water supplies over the entire state.

### Water Rates Increased by Commission.

Hackensack, N. J.—Finding that the revenues now being received by the Hackensack Water Company are insufficient, the state public utility commission has agreed to permit the company to impose a uniform surcharge of 17.5 per cent to all schedules or rates approved by the board in 1917. This extra charge is effective for the quarter ending September 30, 1919. The utility board holds to the schedule it ordered for the company after an exhaustive rate-making adjustment for the company in 1917. The company asked for a horizontal increase of not less than twenty per cent, to take effect as of April I. Adhering to the soundness of its rate decision in 1917, the board said:

> "To disturb the present rate structure in these times of readjustment, when the elements to be considered in operating expenses are so uncertain, would not be sound policy to pursue. The existing rate schedule was found by this board to be just and reasonable after an exhaustive investigation. In their development they were adjusted to meet all requirements of normal times. Under the abnormal existing conditions, however, they have become insufficient, and it is apparent that because of the increased expenditures required to be made in these times, sufficient revenue cannot be obtained from the existing rates. The uncertainty of the future costs of labor and material, however, would not justify the board in reaching any final determination or adopting any permanent measure of relief. Such relief as is necessary should be granted as a temporary relief to await the settlement of labor and material conditions. As indicated above, a surcharge of 17.5 per cent. imposed upon the existing rates would probably meet the company's requirements. Such surcharge should be applied to all schedules of rates, permitted to become effective by the report of this board dated April 28, 1917. This surcharge should be subject to modification as, if and when conditions warrant."

Close check on the operation of the company will be made by the utility board. One of the conditions imposed by the board in connection with the temporary relief granted is that the company must render reports quarterly to the board showing the operating revenues, operating deductions excluding general amortization, non-operating income, income deductions and balance available for amortization, dividends and surplus and amount appropriated for general amortization for each succeeding calendar month, with comparison with the figures for the corresponding month of 1917. The board will retain jurisdiction of the emergency surcharge of 17.5 per cent, for the purpose of modifying or abrogating it should conditions warrant such action. Among the municipalities involved in the application which were represented at the investigation were: Cresskill, Palisades Park, Fort Lee, Englewood Cliffs and Fairview, Bergen county was represented by Clarence Mabie. Others were: Hackensack Improvement Commission, Tenafly, Weehawken, Rutherford Borough, Bogota, West New York, Township of North Bergen, Englewood and Borough of Cliffside Park. The company submitted to the board figures to show that its operating expenses for 1918 increased by $247,983 and taxes were jumped to the increase of $170,245, making a total operating item of $788,682 for 1918 as against $370,454 in 1914. The company claimed a deficit of $281,926 for 1918, or 19.97 per cent. decrease. The utility board found that its experts placed the operating deficit at $261,227, or a deficit of 18.50 per cent in concluding to allow the 17.5 per cent extra-charge the board found that the company was including an item of $25,000 for legal and experts' fees for the rate-making investigation. This item can be lopped off operating expenses in future in view of the company having the board's rate-making figures for a basis in any future case. Legal expenses in the future should not be very heavy, said the board.

### City Wins Water Rights for Future Supply.

San Francisco, Cal.—The city has won the condemnation suit, in which it sought to establish the right to condemn land in the Poopenaut Valley, four miles below the Hetch Hetchy dam site, according to a decision by Judge C. W. Nicol, of Tuolumne County. The suit was brought to determine whether the lands in Poopenaut Valley, owned by the Yosemite Power Co., could be acquired by the city to provide for possible future additions to its mountain reservoir system.

## SEWERAGE AND SANITATION

### Privy Cleaning Ordinance Declared Valid.

Gastonia, N. C.—An ordinance requiring the cleaning and inspection, under supervision of the city, of all surface closets and privies, making an assessment for such work, and providing for the sale of the land in case of non-payment, has been held valid by the Supreme Court of North Carolina. (Ratchford v. City of Gastonia et al., 99 S. E., 21.) The city, under authority of Laws 1917, chapter 136, subchapter 7, section 4, adopted an ordinance containing the above provisions. The plaintiff, a property owner, failed to pay the required assessments and the city advertised some of his property for sale. He applied for an injunction against the sale of the property, but this was refused by the court, which sustained the validity of the ordinance. In the opinion it was said:

> * * * We think this ordinance is a valid exercise of the power reposed in the town authorities for the protection of the health of the people of the town, and that it is fully authorized by the powers expressly conferred by section 4, subchapter 7, chapter 136, Laws 1917, above recited. * * *
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> The necessity of sanitation is fully recognized and is becoming of more and more importance with the knowledge which we obtain of the causes of disease and death. It would be impossible to maintain that cleanliness, which is as necessary for the protection of health and life as courts and juries

> and the administration of justice are * * * [for the protection of life and property] unless this is done by public supervision. The narrowness, or selfishness, or ignorance of one man in not keeping his premises in a clean condition would nullify the action of all the other citizens * * * by turning loose the flies and other insects which may carry the seeds of disease to other homes throughout the city. This general supervision cannot be maintained by collecting the charges for that service from the renter, who may be here today and elsewhere tomorrow. The party responsible is the owner of the premises. The land cannot move. The renter or temporary occupant can do so at will. Therefore the charge is a very proper and necessary one against the property itself, and is authorized by the statute in the same way that the * * * [payment for] adequate paving of the sidewalk and streets and * * * [for] sewerage [is authorized]. * * *
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> The town authorities not only have the power to impose such duty upon the land for the necessary protection of the health of the citizens, but they would be derelict in their duty as such officials, and in proper cases liable to indictment, for failure to protect the health of the public by such necessary regulation. * * *
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> The public health is a matter of importance to the entire neighborhood, and especially to all the inhabitants of a town or city, for the indifference or ignorance or neglect of one man will nullify the precautions taken by all others in that locality. Such ordinance as is here in question is a necessary protection which will be extended in its scope with the increase of knowledge, and can never be diminished. The requirements of sewerage will be better than [those of] such ordinance as this which * * * [provides] the minimum [requirements].

### To Investigate New York Harbor Pollution.

New York, N. Y.—Governor Smith, at Albany, recently directed the state department of health to make a thorough investigation to determine who is responsible for the pollution of waters about New York Bay with coal tar and aniline waste. Complaint that the bathing waters about the beaches were unfit for people to enter because of the amount of tarry substance in the water was made some time ago and carried to the Governor by Franklin Taylor, of Brooklyn, chairman of the committee on pollution of waters of the Waterways League of America. The Governor's order followed a conference with Theodore Horton, chief engineer of the state department of health. The league, in its complaint, charged that the discharge of tar and aniline waste into the waters about New York City would ultimately have a serious effect on ocean bathing and that it also injured the paint on boats. Governor Runyon, of New Jersey, has also taken up the question of harbor pollution and has promised to have responsibility determined and remedies applied. Governor Smith's letter to state health Commissioner Herman M. Biggs directs him "to conduct an investigation of all manufactories situated on or having a drainage connection with any of the public waters of the State of New York in the vicinity of or tributary to waters of New York Harbor and Jamaica Bay, where such factories are engaged in the manufacture or production of coal tar or aniline by-products or waste. This shall include gas houses." The report has not yet been made public.

### Court Decisions on Right to Quarantine Venereal Cases.

Washington, D. C.—The U. S. Public Health Service has summarized recent decisions on the rights of health boards to quarantine infected persons. This right is upheld by the Second District Court of Appeal of California. (Ex parte Johnston, 180 Pac. 644.) A woman was arrested without a warrant, but she submitted to an examination. She was found to be infected with gonorrhea and was confined in a hospital for treatment. In refusing to grant a writ of habeas corpus the court held that under the law the health department had the right to isolate such person to prevent the spread of disease. The court said:

> * * * In the absence of any showing to the contrary, we must, upon the evidence before us, assume that petitioner was, when subjected to quarantine regulations, and is now, afflicted with and suffering from gonoccoccus infection, which, by section 2979a, Political Code (Stats. 1917, p. 171), is, with leprosy, smallpox, typhus fever and a number of other diseases declared to be contagious and infectious. The sole question thus presented is the right of proper authorities to isolate and place her in quarantine. By the section of the code just cited it is made the duty of the health officer, knowing of the existence of any such contagious or infectious disease, to take such measures as may be necessary to prevent the spread thereof. The isolation of one afflicted with a contagious or infectious disease is a reasonable and proper, indeed the usual, measure taken to prevent the increase and spread thereof. * * * Nor can her arrest without a warrant, after which, and while being illegally held, an examination was made with her consent which disclosed the existence of the infection, avail her in this proceeding. Assuming the action of the police officer arbitrary and unjustified, she is not restrained of her liberty by reason thereof, but on account of a disease with which she was subsequently found to be afflicted, and in the ascertainment of which fact there appears to have been no arbitrary or unlawful action taken.

It has been decided (Ex parte Hardcastle, 298 S. W. 531.) by the Court of Criminal Appeals of Texas that a person arrested and held in quarantine by order of a health officer on the charge of being infected with a venereal disease can have the legality of his detention inquired into by the courts through habeas corpus proceedings. A woman was arrested under a warrant issued by the health officer of San Antonio and detained without a preliminary hearing. The court held that this could be done but that the order of the health officer holding her in quarantine was not final and that she could not be denied the right to prove the nonexistence of the facts upon which her detention was based. Portions of the opinion follow:

> * * * The legislature, under the police power, has authority to authorize the establishment of quarantine regulations for the protection of the public against contagion from those persons whose condition is such as to spread disease, and, incident thereto, to authorize the arrest and detention of such persons, and such, we understand, is the purpose of the statute in question. Under its terms the proper health officer may issue a warrant by virtue of which a lawful arrest may be made without preliminary thereto affording the person affected a hearing; but if, after arrest, such person challenges the right of the authorities to continue the detention, the fundamental law accords him the right to have the legality of his detention inquired into by a proper court in a habeas corpus proceeding. The law denies to no one restrained of his liberty without a hearing the right to prove in some tribunal that the facts justifying his restraint do not exist. (Ruling Case Law, vol. 6, p. 435, sec. 449.) The health authorities causing the arrest of relator derive their power to do so from the alleged existence of the fact that the relator is affected with the disease mentioned, and that her detention is required in the public interest to prevent contagion. If those facts do not exist, the officer has no jurisdiction to continue the restraint and the court in habeas corpus proceeding has authority to inquire whether the facts essential to jurisdiction exist (Ex. parte Degener, 30 Tex. App. 566, 17 S. W. 1111.) * * * Our statute does not declare that the initial order of arrest shall be conclusive; nor does it designate any tribunal to whom one detained under an order of arrest issued by the health officer may appeal for a hearing. The fair and reasonable interpretation of the statute under which relator is held, we think, is that which accords the health officer the power to order the arrest and detention, leaving to the person detained the right to invoke decision of the established judicial tribunals of the State on questions raised, either of fact or law, involving the validity of the detention. We conclude that under the act of the legislature in question the relator had the right to a hearing on a writ of habeas corpus, and therein to prove the non-existence of the facts necessary to authorize her continued detention and thereby obtain release.

## TRAFFIC AND TRANSPORTATION

### Study Vehicular Traffic Congestion on New York Bridges.

New York, N. Y.—Vehicular traffic over the four East River bridges has become so congested that mayor Hylan has appointed a special committee to devise means of improving conditions on the bridges and increase, if possible, their carrying capacity. One reform on which a decision has been reached is to make the Manhattan Bridge a highway exclusively for motor vehicles and the Brooklyn Bridge a highway exclusively for horse drawn vehicles. By thus separating the slow moving vehicles from the faster ones, the committee hopes to increase the vehicular traffic over the bridges and avoid the tie-ups that have occurred on both structures when horse drawn vehicles have clogged up the roadways and compelled automobiles to follow behind at a slow pace. The bridge committee is headed by Dr. John A. Harriss, deputy police commissioner; chief engineer Edward A. Byrne, of the department of plant and structures, is secretary, and the other members are borough president Frank L. Dowling, of Manhattan, borough president Edward Riegelmann, of Brooklyn; borough president Maurice E. Connolly, of Queens; commissioner Grover Whalen, of the department of plant and structures; William H. English, W. H. Todd, Joseph J. O'Brien, Peter J. Collins and transit construction commissioner John H. Delaney. The appointment of this committee has revived the plan for a "triborough bridge" connecting Queens, the Bronx and Manhattan, as a means of providing extra means of interborough communication. The enormous increase in automobile traffic between the boroughs has emphasized the necessity for providing additional means of communication between various parts of the city. Commissioner Delaney, before leaving the city administration, had taken up again the study of the triborough bridge plan first projected by commissioner F. J. H. Kracke in 1916. Thomas Hastings, the architect, has also looked into the plan with a view to using it as a memorial to the men of the city who died in service during the war. Mr. Hastings after a cursory study reported to commissioner Delaney that he believed that approaches to the bridge in the three boroughs could be made the site of appropriate memorials to the war heroes. When the plans for the coming bridge were first made it was estimated that the cost at normal prices for materials and labor would be about $10,500,000. The advance in the cost of materials and labor would make the cost now between $15,000.000 and $20,000,000, it is estimated. In the outline of its plans for the bridge, the department report said:

> "The department has prepared a plan showing a layout for a proposed bridge to connect the Boroughs of Manhattan, Bronx and Queens, with terminals at 125th street and First avenue, Mannattan; St. Ann's avenue and Southern Boulevard, Bronx, and Second and Potter avenues, Queens. The total length of the bridge will be about 15,000 feet. The bridge will have facilities for continuing the rapid transit lines from Manhattan, which now terminate at Astoria in the Borough of Queens, to the Borough of the Bronx, connecting in that borough with the new rapid transit line on the Southern Boulevard. It will also provide for vehicular and pedestrian traffic, as well as for a double-track surface railway.
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> "Crossing the Hell Gate Channel the bridge will be carried by means of a cantilever span. For the approaches in the Borough of Queens and on Ward's and Randall's Islands, including the crossing of Little Hell Gate, concrete steel will be used.
>
> "The Manhattan connection, extending from Randall's Island to First avenue and 125th street, will be similar in design to the present draw bridges over the Harlem River, with the exception that the opening for navigation purposes will be made by a lift span instead of swing span.
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> "The design provides for the connection of Randall's Island and Ward's Island with the bridge by means of an inclined approach that will accommodate both vehicular and pedestrian traffic. The only means of connection that these islands now have with the mainland is by boats. This proposed approach will lessen the cost of transporting foot passengers, supplies, materials, etc., and will make these islands with their many institutional buildings more easy of access and more available for the service required.
>
> "The construction of this bridge would mean that the upper part of Manhattan would be more easy of access from Long Island, which will naturally mean a reduction in the cost of handling the products of the many farms on Long Island.
>
> "A very important reason for the construction of this bridge is the extension of the rapid transit line from the Astoria terminal to the Borough of the Bronx. By this connection an additional north and south rapid transit line will be provided in addition to the old subway route now in operation and the new Lexington avenue line, which will be ready for operation within the next few months.
>
> "If this structure is built it will mean that when the crosstown (Brooklyn) line is completed traffic from Brooklyn will be able to reach the Bronx without going through the Borough of Manhattan, thus saving time, as well as causing a reduction in congestion on the Manhattan lines during rush-hour periods."

### To Enforce Motor Vehicle Regulations.

Harrisburg, Pa.—The state highway department has announced that after Sept. 15 it will ask the police authorities for a rigid enforcement of the provisions of Act No. 283, regulating the use, operation, etc., of motor vehicles. In the opinion of the state highway commissioner, ample time will have elapsed from the approval of this law to permit of complete compliance with its requirements. Arrangements have been made by the department to put out a motor squad of inspectors, fully empowered to act, and equipped with devices for checking and testing excessive weights, glaring lights, etc. Inspectors will also be used in checking up the establishments of dealers in second-hand motor vehicles and the records of public garages. Specifications for light tests have also been prepared, and the department is now in position to make proper road and laboratory tests for controlling the front lights on motor vehicles, so that they shall comply with the provisions of this act.

### Few Accidents on Municipal Street Railway.

San Francisco, Cal.—Although 59,341,253 passengers were carried by the municipal railway during the last year, there were only ten fatal accidents, according to a report filed by J. B. Leighton, claims adjuster for the city. Claims settled as the result of all accidents during the year amounted to 0.0111 per cent. of the gross revenues.

## MISCELLANEOUS

### Government to Sell Big City.

Nitro, W. Va.—This city, with living and business accommodations for 20,000 people, built by the government at a war-time cost of $70,000,000, is for sale to the highest bidder. The War Department, in announcing the sale, describes it as embracing 737 manufacturing buildings and the utilities and civic improvements of a modern city. Nitro is the site of the second largest smokeless powder plant in the world. The bids, which must cover not only the powder plant and other units which were erected to prepare ingredients for powder making, but the civil community as well, will be opened at 12 o'clock noon on September 30 next at the office of the chairman of the Ordnance District Salvage Board, 1710 Market street, Philadelphia, Penn. When the contractors broke the ground for this city on February 1, 1918, the 1,800 acres it now embraces were sloping fields that dipped down from the foothills of the Appalachian Mountains to the east bank of the Kanawha River. Just eight months later, when the armistice was signed, the plant, which began operations ten days before, had turned out 6,000,000 pounds of powder. Government engineers report the plant adapted to chemical manufacturing and cotton and wood pulp paper making. The industrial community of Nitro stretches for more than four miles along the east bank of the Kanawha River. It includes a number of big chemical plants, shops, mills and laboratories. The civic community contains more than 1,500 furnished portable houses; seventy-five permanently constructed executive residences, hotels, boarding houses, dormitories, club houses, general and special stores, cafeterias and moving picture houses; a modern 400-bed hospital designed and erected under the supervision of the Federal Public Health Service; a twenty-four-room school house; barracks and mess halls, Y. M. C. A. buildings and recreation halls, capable of providing housing and feeding facilities for 8,000 workmen without families. Standing between the factory section and the residential area is the administrative section, consisting of office buildings, a police station, a fire station, a bank, a disbursing building, inspection offices, traffic offices and a telephone and telegraph building. A transportation system equipped with steam and storage battery locomotives and flat and transfer cars, and consisting of eighteen miles of permanent broad gauge railway, ties the industrial area together. A pitch-surfaced macadam roadway extends throughout the length of the reservation, the branches of which, running into the manufacturing area and the residential section, facilitate horse-drawn and motor vehicle transportation. A complete telephone system, with main and branch exchanges, provides inter-plant and residential communication. The health of the community is protected by a complete sewer system which serves the manufacturing and residential sections. The water system has a pumping capacity of 57,600,000 gallons and a filtration plant for household water. The fire-fighting apparatus is up-to-date, the power house has been provided with fire pumps and more than one-half of the manufacturing buildings are equipped with automatic sprinklers. Nitro is located geologically in the center of the New River and Kanawha districts, which produce the highest grade of steam and coking coals produced in the United States. The annual output of the mines in this territory is approximately 30,000,000 gross tons. Surrounding the town is one of the most extensive natural gas producing areas in the United States, the daily capacity of the fields contiguous to Nitro being in excess of 500,000,000 cubic feet. Constantly developing crude petroleum areas yield oils of excellent grade and high quality salt brines. While only bids for the entire property will be considered, the government recommends that parties interested in particular units of the development associate themselves for submitting a bid for the entire property. To facilitate such efforts the government's agents will endeavor to put parties interested only in particular units in communication with parties interested in acquiring other units. Each bid must be accompanied by a certified check, a draft, or money deposit of $500,000, and the purchase must be either by cash payment or part cash, and amply secured deferred payments. The War Department has reserved the right to reject all bids. Information concerning the plant and its facilities and the terms and conditions of the sale may be obtained by communicating with chairman, Ordnance District Salvage Board, 1710 Market street, Philadelphia, or the officer in charge of the plant at Nitro, W. Va., or the Plant and Plant Facilities Section, office of the director of sales, Munitions Building, Washington, D. C.

# THE MUNICIPAL INDEX

## In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading ones published in other countries, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In addition to the titles, where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article. Also the name and the place of publication of the periodical in which it appeared.

### ROADS AND STREETS.

**Maintenance:;**

Highway Maintenance in Wisconsin. Plan adopted by Highway Commission for taking care of highways by patrol system; duties of patrolmen; earth road maintenance; good grading and drainage essential to adequate upkeep; use of graders; drags and dragging; use of road planers and graders; methods for sandy and clayey roads; care of roadside; cuts and fills; guard rail; oiled earth roads. From "Highway Maintenance," Wis. Highway Commission. 2,200 words. Good Roads, Aug. 13; 2,200 words, Good Roads, Aug. 20; 2 ills., 2,100 words, Good Roads, Aug, 27, New York.

Patrol Maintenance in Essex County. Operated sucessfully for a number of years; total cost for last year, $32,096 for labor and $27,541 for broken stone. 300 words. Municipal Journal and Public Works, Aug. 2, New York.

Lessons from 1918 Experiences of Patrol System of Road Maintenance in Wisconsin. 1 ill., 1,300 words. Engineering and Contracting, Aug. 6, Chicago.

Cost of Earth Road Maintenance with Tractor Outfit and with Mule Outfit. 400 words. Engineering and Contracting, Aug. 6, Chicago.

Surface Treatment of French Roads. French engineer officers admit Americans have right idea in surface treating their roads before they begin to disintegrate. By Capt. C. E. Murphy, asphalt sales dept., Texas Co. 1 ill., 400 words. Good Roads, Aug. 13, New York.

Maintenance of Earth, Gravel and Macadam Roads. Misconception regarding permanent roads. From paper before Canadian Good Roads Congress, by Capt. J. A. Duchastel, city manager, Outrement, Quebec. 1,600 words. Engineering and Contracting, Aug. 6, Chicago.

Maintenance Costs of Primary Highways in Washington for Two-Year Period. 1,796 miles now under joint maintenance; 50 to 75 per cent of all traffic carried by primary routes. By G. F. Cotterill, chief engr., Washington State Highway Commission, Olympia. 4 ills., 6,500 words. Municipal and County Engineering, August, Indianapolis, Ind.

High Cost of Maintenance of Light Macadam Highways. Large sums expended annually merely keep up improved roads; narrow roads more expensive than wide. By F. S. Greene, N. Y. state commissioner of highways. 3,200 words. Engineering News-Record, Aug. 21, New York.

Patrol Maintenance in Maine. Total of 480 patrolmen cared for 4,235 miles of road; total expenditure for labor and material was $568,800. 300 words. Municipal Journal and Public Works, Aug. 2, New York.

Recommended Method of Resurfacing an Old Macadam Road That Is Filled with Ruts and Holes. By Wm. N. Bosler, div. engr., Dept. of Public Roads, Frankfort, Ky. 1,500 words. Municipal and County Engineering, August. Indianapolis, Ind.

**Designing and Theory:**

Proportion and Reasonable Economy in Rural Road Design. Correct alignment, grades, surfacing, foundations; plans for 2,000 miles of road reviewed; recent practice a marked improvement over 10 years ago. By W. G. Harger, Rochester, N. Y. 1 ill., 4,000 words. Engineering News-Record, Aug. 14, New York.

Stresses in Concrete Road Slabs from Wheels of Heavy Truck. Special pressure cells designed; summarized results of investigation. 1,000 words. Canadian Engineer, Aug. 28, Toronto, Ont.

Stresses in Concrete Road Slabs from Wheels of Heavy Trucks. 1,000 words. Engineering and Contracting, Aug. 6, Chicago.

Procedure in Making Tests of Effect of Motor Truck Traffic on Road Surfaces. By A. T. Goldbeck, acting chief, div. of tests, Bureau of Public Roads, Washington, D. C. 500 words. Municipal and County Engineering, August, Indianapolis, Ind.

Standard Details of New Jersey State Highway Department for Minor Features of State Roads. 1 ill., 400 words. Engineering and Contracting, Aug. 6, Chicago.

Steel Paving Guards. Results of two years' experience in Philadelphia, Pa. By C. F. Puff, Jr., ass't chief engr., Bureau of Highways, Philadelphia. 1 ill., 300 words. American City August, New York.

Progressive Method of Road Improvement. Straightening is frequently profitable; obstacles to be overcome; foundation problems; temporary gravel roads. By G. Henry, chief engr., dept. of roads, Quebec. 5,500 words. Canadian Engineer, Aug. 7, Toronto, Canada.

How Long Should Concrete Base Set? Editorial referring to article in this issue on "Quick Work in Laying Granite Block Pavement." 700 words. Municipal Journal and Public Works, Aug. 30, New York.

Civic and Engineering Features of Grade Crossing Elimination. By A. L. Golinkin, recently as't civ. engr., division of bridges and grade crossings, N. J. Public Utility Comn., 1105 S. Richmond St., Chicago. 1 ill., 2,800 words. Municipal and County Engineering, August, Indianapolis, Ind.

Grade-Crossing Elimination at Indianapolis. History reviewed; elevated tracks replace street viaducts; freight terminals affected; total cost, $18,000,000. 1,600 words. Engineering News-Record, Aug. 7, New York.

**Constructing:**

Mr. Breed Favors Day Labor Only as a Last Resort. From report of former first deputy highway commissioner of New York Commission of Highways. 700 words. Engineering and Contracting, Aug. 6, Chicago.

Selection and Use of County Road Machinery. Factors influencing selection; contract method favored; care of machinery. By J. R. Johnson, div. engr., Kentucky Dept. of Public Works, Pineville, Ky. 2,000 words. Municipal and County Engineering, August, Indianapolis, Ind.

New Device Scoops Up and Loads Asphalt Pavement in One Operation. By R. H. Moulton, Board of Trade, Chicago. 2 illus., 300 words. Engineering News-Record, Aug. 7, New York.

Method of Striking Off Widened and Super-elevated Highway Curves. 1 ill., 300 words. Engineering and Contracting, Aug. 6, Chicago.

Road Building 24 Hours Per Day. Possibilities pointed out by Wm. Ord in article in "Successful Methods." Location of lights for night work; mixing, finishing and curing at night; economies effected by night work. 2 ills., 2,000 words. Engineering and Contracting, Aug. 6, Chicago.

Convicts on Road Work. Experience with use of convicts or "inmates" in states of Arizona, Florida, Idaho, Illinois, Louisiana, Maryland, Nebraska, New Jersey, Oklahoma, Utah, West Virginia and Wyoming. 4 ills., 4,500 words. Municipal Journal and Public Works, Aug. 2, New York.

Using Convicts for Road Construction. Editorial discussion of the increase and general approval and satisfactoriness of such use. 300 words. Municipal Journal and Public Works, Aug. 9, New York.

**Concrete Paving:**

Overcoming Difficulties in Laying Concrete in Cramped Alleys. By W. W. Horner, chief of Div. of Sewers and Paving, St. Louis, Mo. 2 ills., 700 words. Engineering News-Record, Aug. 7, New York.

Organization of Efficient Concrete Road Construction Gangs. From "Concrete Highway Magazine," by H. P. Gillette. 2,200 words. Canadian Engineer, Aug. 21, Toronto, Ont.

Recommended Practice of Mississippi Valley State Highway Departments for Concrete Road Construction. 2,500 words. Canadian Engineer, Aug. 28, Toronto, Ont.

Labor Saving Material Handling Plant for Concrete Road Construction. Being employed in construction of 6.3 mi. concrete road near Laurel, Del. Described by A. R. Losh, acting district engr., U. S. Bureau of Public Roads in "Public Roads." 2 ills., 600 words. Engineering and Contracting, Aug. 6, Chicago.

Recommended Practice of Mississippi Valley State Highway Departments for Concrete Road Construction. From report at conference held last February. 2,300 words. Engineering and Contracting, Aug. 6, Chicago.

Suggestions for Contractors on Concrete Road Construction. Careful overhauling of equipment; take care of subgrades; economy in use of trucks. By C. E. Learned, highway engr., U. S. Bureau of Public Roads, from "Public Roads." 1,800 words. Engineering and Contracting,, Aug. 6, Chicago.

**Granite Block:**

Quick Work in Laying Granite Block Pavement. Half-mile of Seventh Ave., New York, paved in forty working days; street crossings closed to traffic only three days; composition of working gangs and methods employed. By C. D. Pollock, of Pollock & Taber, consulting engrs., N. Y. City. 5 ills., 1,500 words. Municipal Journal and Public Works, Aug. 30, New York.

Proposed Specifications for Block for Granite Block Pavement. Submitted by commitee on road materials of which A. H. Blanchard is chn., at meeting of American Society of Testing Materials. 400 words. Engineering and Contracting, Aug. 6, Chicago.

**Brick:**

New Mechanical Methods Employed with Marked Success in Building Monolithic Brick Road from Ashtabula to Conneaut, O. By F. A. Churchill, Conneaut. 1 ill., 1,500 words. Municipal and County Engineering, August, Indianapolis, Ind.

Illinois Brick Paving Specifications. Why no bids were received for brick construction on Lincoln and Dixie highways. Letter to editor by H. C. Adams, pres., Illinois Clay Manufacturers' Ass'n, Danville, Ill., and reply by Clifford Older, chief highway engr., Springfield, Ill. 4,200 words. Engineering News-Record, Aug. 21, New York.

**Bituminous:**

Determination of Softening Point of Bituminous Materials. Revised method submitted by commitee on road materials at meeting of American Society for Testing Materials. 1 ill., 800 words. Engineering and Contracting, Aug. 6, Chicago.

Municipal Ashpalt Plant of District of Columbia. Record of operation for 1918, with cost data. By C. B. Hunt, engr. of highways, District of Columbia. 2 ills., 600 words. American City, August, New York.

Asphaltic Pavements at Ashokan. Four-year old asphaltic concrete pavement on 30 miles of highway around Ashokan reservoir of New York's water supply system standing up under heavy automobile traffic. By R. R. Barrett, engr., the Texas Co. 3 ills., 800 words. Good Roads, Aug. 20, New York.

Advantages of Tank Car Shipments of Asphalt. By Chas. E. Murphy, asphalt sales dept., the Texas Co. 3 ills., 1,400 words. Engineering and Contracting, Aug. 6, Chicago.

Calol Asphaltum as a Road Binder. Has proven satisfactory through long experience on Pacific coast; used on streets bearing heavy traffic. 1,000 words. Pacific Municipalities, August, San Francisco, Cal.

**Financial:**

State Expenditures for Roads. Total outlay of states for permanent improvements was $66,207,696; of this $40,071,045 spent for roads. 150 words. Municipal Journal and Public Works, Aug. 9, New York.

The Highway Bond as a "Gilt-Edge" Security. By B. F. Harris, pres., 1st Natl. Bank, Champaign, Ill. 800 words. Engineering and Contracting, Aug. 6, Chicago.

Cost and Life of New York State Highway Pavements. From paper before N. Y. chapter of American Society of Civil Engrs., by H. E. Breed, formerly first deputy highway commissioner of N. Y. State. 800 words. Engineering and Contracting, Aug. 6, Chicago.

**Traffic:**

Traffic Control on Feeder Highways. Editorial recommending systems of licensing, with prescribed zones, in which certain weights of trucks may operate, as plan warranting attention. 1,100 words. Engineering News-Record, Aug. 7, New York.

Highways as Feeders. Development of efficient rail, electric and water facilities dependent upon establishment of highway transportation facilities such as will prove complementary to such systems, according to statement of Highways Transport Committee. 600 words. Municipal Journal and Public Works, Aug. 16, New York.

**Miscellaneous:**

Instructions Governing Sampling and Inspection of Road Making Materials in New Jersey. Recently prepared by W. G. Thompson, state highway engineer. 3,300 words. Municipal and County Engineering, August, Indianapolis, Ind.

Gravelled Side-Drives. Being constructed northwestern section of New York state. 75 words. Municipal Journal and Public Works, Aug. 2, New York.

Main-Route Highway Construction in New Jersey. Work on route between Jersey City and Philadelphia of heavy-slab type; drainage main feature; convict labor on one section. 3 ills., 800 words. Engineering News-Record, Aug. 28, New York.

American Soldiers Advocate Good Roads. Writer in "Amaroc News," official organ of American army of occupation, urges necessity of road betterment in America. 1,500 words. Good Roads, Aug. 13, New York.

Birmingham (England) Paving Notes. Has about 27 miles of wood block pavement mostly creosoted deal. 200 words. Municipal Journal and Public Works, Aug. 30, New York.

Do Not Neglect Minor Roads. They are the only connection between country districts, where nation's food is produced, and cities. 250 words. Municipal Journal and Public Works, Aug. 2, New York.

Pennsylvania Leads in Highway Work. Contracts for 601 miles already let. 150 words. Municipal Journal and Public Works, Aug. 2, New York.

Some Lessons from French Roads. These macadam roads carried heaviest traffic known; bituminous treatment proved beneficial; over eight hundred million dollars' worth of macadam and gravel should be improved, not destroyed. By Maj. E. A. Kingsley, supt. of roads, A. E. F., France. 3,700 words. Municipal Journal and Public Works, Aug. 9, New York.

Good Roads. Bad road tax is more than good road tax; greater part of money left in county; false reports of costs of roads. From address at Williamsburg, Ky., by R. Wiley, commissioner of public roads of Kentucky. 1,600 words. Engineering and Contracting, Aug. 6, Chicago.

Lack of Expert Engineering Advice in Paving Matters Costs the Public Vast Sums. By H. W. Skidmore, Chicago Paving Laboratory, Chicago. 1,200 words. Municipal and County Engineering, August, Indianapolis, Ind.

How to Provide a County with Good Roads. Best way to form a good roads organization. 600 words. Municipal and County Engineering, August, Indiaiapolis, Ind.

Task Confronting Highway Surveyors. Foundations and lateral support; granite set and wood paving; Durax; tar macadam; pitch grouting; bitumen carpeting; concrete roads. Paper before Institution of Municipal and County Engineers, by H. T. Chapman, M. Inst. C. E. Discussion. 6 ills., 8,000 words. Jornrnal of Institution of Municipal and County Engineers, Aug. 2, London, England.

Paving of Streets and Aisles, Brooklyn Army Supply Base. Types suit traffic and construction conditions; granite used for heavy traffic, asphalt blocks for medium and special construction, and bitulithic for light traffic. 7 ills., 2,300 words. Engineering News-Record, Aug. 28. New York.

## SEWERAGE AND SANITATION.

**Sewage Treatment:**

Sewage-Treatment Works at Langley Field, Va. Imhoff tank with receiving bowls, inlet channels, bar screen, distributing channel with downtakes; a dosing chamber, ventilated sprinkling filters and final settling tanks to be added. By T. Saville, assoc. prof. sanitary engrg., Engrg. University of N. C., and C. L. Weil, C. E., N. Y. City. 6 ills., 2,500 words. Engineering News-Record, Aug. 21, New York.

Electrolytic Sewage Treatment. Investigation by committee of Franklin Institute of plant at Easton, Pa.; figures obtained during test run and conclusions of committee. 1,200 words. Municipal Journal and Public Works, Aug. 30, New York.

Operating Results of "Direct Oxidation" Experimental Sewage Treatment Plant at Easton, Pa. Summary of results of tests. Given in report of C. A. Emerson, Jr., chief of engrg. division of dept. 1 ill., 5,000 words. Engineering and Contracting, Aug. 13, Chicago.

Results of the Test Run of the Direct Oxidation Experimental Sewage Treatment Plant at Easton, Pa. By C. A. Emerson, Jr., chief engr., Pa. Dept. of Health, Harrisburg. 1 ill., 6,000 words. Municipal and County Engineering, August, Indianapolis, Ind.

Results of Two 24-Hour Tests of Two Riensch-Wurl Sewage Screens at Dyckman St., Manhattan, N. Y. Letter to editor from Kenneth Allen, sanitary engr., Municipal Bldg., New York. 1 table, 300 words. Municipal and County Engineering, August, Indianapolis, Ind.

Extraction of Grease from Dried Activated Sludge. Experimental studies carried on at University of Illinois as a thesis by D. F. McFarland, under direction of E. Bartow. 1 ill., 1,700 words. Engineering and Contracting, Aug. 13, Chicago.

Station for Disposing of Night Soil. Latest practice of public health service as employed at Montgomery; method and cost of operating station. 5 ills., 1,800 words. Municipal Journal and Public Works, Aug. 9, New York.

Sewage and Wastes Disposal for the United States Army. Review of work by L. S. Doten, Maj., Q. M. C., in paper before American Society of Civil Engrs. 3 ills., 2,200 words. Engineering, Aug. 13, Chicago.

**Sewerage:**

Concrete Sewer Pipe Specification of American Concrete Institute Committee. 900 words. Engineering and Contracting, Aug. 13, Chicago.

Large Concrete Sewage Pipe. 72-inch inside, 8 feet long, with 7-inch walls; 2,370 lin. ft. to be laid in Milwaukee. 9 ills., 1,800 words. Engineering World, Aug. 1., Chicago.

Calumet Pumping Station and Intercepting Sewer. Underground structure; sewage chamber; outflow from pumping station; handling concrete. By W. T. Christine. 11 ills., 3,500 words. Engineering World, Aug. 15, Chicago.

Cleaning of Receiving Basins and Grit Chambers by Hydraulic Methods. By C. E. Gregory, former engr. in charge of sewers, Manhattan, N. Y. 1 ill., 1,600 words. American City, August, New York.

Graphical Method for Estimating Storm-Water Run-off. By R. W. Horner, with Fay, Spofford & Thorndike, engrs., Boston, Mass. 1 ill., 700 words. Engineering News-Record, Aug. 7, New York.

**Sanitation:**

Sanitation and Municipal Death Rates. Begining of municipal sanitation; how much can city afford to spend for sanitation? By Geo. A. Soper, maj., Sanitary Corps., U. S. A., from paper before Pan-American Commercial Conference. 1,700 words. Engineering and Contracting, Aug. 13, Chicago.

Fishes for Exterminating Mosquitoes. Investigations by Bureau of Fisheries and Public Health Service of the surface minnow for destroying mosquito larvae. 1 ill., 1,200 words. Municipal Journal and Public Works, Aug. 30, New York.

Royal Sanitary Institute: Annual Congress at Newcastle. Housing difficulties discussed; pollution of rivers; sanitation in the field. 2,000 words. Municipal Engineering and Sanitary Record, Aug. 14, London, England.

Typhoid from Polluted Streams. Editorial reference to the pollution of the Canadian river by the discharge of sewage from Oklahoma City. 300 words. Municipal Journal and Public Works, Aug. 9, New York.

Relation of a Private Well to Typhoid. Average well a public menace; results of well water tests in Indiana. Paper before Indiana Sanitary and Water Supply Ass'n, by H. E. Barnard, Ph.D., state food and drug commissioner, Ind. 2,500 words. Pacific Municipalities, August. San Francisco, Cal. 500 words. Engineering and Contracting, Aug. 13, Chicago. 2,200 words. Fire and Water Engineering, Aug. 20, New York.

## WATER SUPPLY.

**Rates and Meters:**

Water Rates and Fire Protection Charges. Data from several hundred cities of the United States; maximum and minimum rates; changes since before war; receipts for public hydrants and private fire protection. 300 words, 2 pages tables; Aug. 2, 350 words, 2 pages tables; Aug. 9, 400 words, 1½ pages tables; Aug. 16, 2 pages tables; Aug. 23, 3 pages tables. Municipal Journal and Public Works, Aug. 30, New York.

Flat Rate vs. Meters. Comparison between operating conditions under the two methods of charging for water; flat-rate system unjust to consumers; meters profitable. By C. E. Abbott, water works supt., Tuscaloosa, Ala. 2,200 words. Canadian Engineer, Aug. 14, Toronto, Ont.

Water Department and Private Fire Lines. Proper regulations governing private fire protection lines; suggestions for compensation; contamination of water supply; references to court decisions concerning fire protection. By D. R. Gwinn, Terre Haute, Ind. 2,700 words. Fire and Water Engineering, Aug. 20, New York.

Hydrant Rentals. Should be based upon total cost to company or department for furnishing fire protection in addition to what cost would be for furnishing water for consumption only. 500 words. Municipal Journal and Public Works. Aug. 9, New York.

**Purification:**

Motor Truck Mounted Water Purification Units. Abstract of paper at convention of American Water Works Ass'n, by Wm. J. Orchard, sanitary engr., Wallace & Tiernan Co., Inc. 3 ills., 1,700 words. Engineering and Contracting, Aug. 13. Chicago. 8 ills., 2,500 words. Engineering World, Aug. 1, Chicago. 6 ills., 2,000 words. Canadian Engineer, Aug. 7, Toronto, Canada.

Chlorine Absorption and the Chlorination of Water. Study of rate of disinfection of varying waters. 2,000 words. American City, August, New York.

Rotary Water Screens. Used successfully by city water department, St. Paul, Minn. Driven independently of each other. 500 words. Fire and Water Engineering, Aug. 20, New York.

**Pumping:**

Factors in Selection of Pumps for Small Water Works. Operating economy important because of financial limitations; various types reviewed; some cost comparisons. 2,600 words. Engineering News-Record, Aug. 28, New York.

Motors for Fire and Water Service. Gasoline engines of automobile type coming into general use for standby fire service and for driving pumps and generators in water work plants. 4 ills., 1,000 words. Fire and Water Engineering, Aug. 6, New York.

Meters and Measuring Devices for the Boiler Room. From report of committee of prime movers at National Electric Light Ass'n. 2,000 words. Engineering and Contracting, Aug. 13, Chicago.

**Distribution System:**

Disadvantages of Locating Water Mains in Alleys. 800 words. Engineering and Contracting, Aug. 13. Chicago.

Moose Jaw Water Supply. Commissioner Mackie favors plan for a 24-inch continuous wood stave pipe line from Caron head works to Saskatchewan river at cost of $1,630,000. From Western Canada Contractor. 2,200 words. Canadian Engineer, Aug. 28, Toronto, Ont.

Leakage Test of Wood-Stave Pipe Line. By V. M. Crown, C. E., Portsmouth Water Development, Q. M. C., U. S. A., Suffolk, Va. 2 ills., 1 table, 500 words. Engineering News-Record, Aug. 7, New York.

**Miscellaneous:**

Advantages of Classified Cash Book in Water Works Accounting. By A. L. Sawyer, water registrar, Haverhill, Mass. 4 ills., 1,500 words. Engineering and Contracting, Aug. 13, Chicago.

Economies of Reinforced Walls for Uncovered Reservoirs. By H. E. Babbitt, asso. in municipal and sanitary engrg., University of Illinois. 16 ills., 800 words. Canadian Engineer, Aug. 28, Toronto, Ont.

Akron's New Water Tank. Bids were asked for a 150,000-gallon tank of three alternative designs, with desire to provide structure less objectionable than usual steel tank. 200 words. Municipal Journal and Public Works, Aug. 30, New York.

Design Features and Form of Contract for Constructing a Large Earthen Water Supply Dam on Cost Plus Fee Basis. By J. L. Crane, Jr., and J. G. Kimmel, with Gannett, Seelye & Fleming, engrs., Harrisburg, Pa. 2 ills., 2,400 words. Municipal and County Engineering, August, Indianapolis, Ind.

Water Conservation in the Cantonments. Average consumption much greater than had been assumed. 400 words. Municipal Journal and Public Works, Aug. 2, New York.

Curtailing Water Waste and Fixing Equitable Rates at Sault Ste. Marie, Mich. Municipal ownership not always a bar to efficiency. By W. M. Rich, city manager, Sault Ste. Marie. 2,800 words. Municipal and County Engineering, August, Indianapolis, Ind.

Relation Between Water Works Improvements and Fire Insurance Rates. By K. L. Walling, Ia. Insurance Service Bureau, Des Moines, Ia. 2,100 words. Municipal and County Engineering, August, Indianapolis, Ind.

Water Works and Insurance Rates. Relation between improvements to water works and decrease of fire insurance rates; requirements for water works in respect to fire protection; grading of cities. By K. L. Walling, Iowa Insurance Service Bureau. 2,000 words. Fire and Water Engineering, Aug. 13, New York.

How Water Supply for 6,000,000 People Is Made Safe. By Wm. W. Brush, deputy chief engr., Bureau of water supply, gas and electricity, N. Y. City. 4 ills., 4,500 words. Municipal and County Engineering, August, Indianapolis, Ind.

Special Features of the Gallery Water Collecting System of the Des Moines Water Co., Des Moines, Ia. By A. F. Luce, C. E., engr. and supt., Des Moines Water Co. 4 ills., 2,900 words. Municipal and County Engineering, August, Indianapolis, Ind.

Water Expectancy in Mines, Tunnels and Deep Wells in Homogeneous Rocks. 1,500 words. Engineering and Contracting, Aug. 13, Chicago.

The Distribution of Water. Distribution force has to deal with unthinking and unreasonable public on all questions of lack of pressure and quantity, deterioration in quality, incorrect meters, etc. By E. E. Wall, water commissioner, St. Louis, Mo. 2,000 words. Municipal and County Engineering, August, Indianapolis, Ind.

Water Supply of Palestine. Some problems that confronted American Red Cross engineering and medical units in Holy Land. Variable climate and water supply. By H. Y. Carson, formerly captain and sanitary engr., American Red Cross Commisison to Palestine. 2 ills., 1,100 words. Fire and Water Engineering, Aug. 6, New York.

Boonville Municipal Water Works. Report of board of public works gives history of water works from time of purchase in 1905 up to date; first and only report of board. 1,000 words. Municipal Journal and Public Works, Aug. 9, New York.

Pooling of Water Supplies. Discussion of practice under which big municipalities secure monopoly of important water-sheds, to detriment of smaller authorities. 500 words. Municipal Engineering and Sanitary Record, Aug. 14, London, England.

## LIGHTING AND POWER.

**Street Lighting:**

Street Lighting in Baltimore. Most lamp fixtures are owned and all operated by private corporations; prices paid; lighting alleys; street signs. 1,200 words. Municipal Journal and Public Works, Aug. 16, New York.

Bridge Lighting in Baltimore. Part of description of "Street Lighting in Baltimore" omitted from issue of Aug. 16 for lack of space. 300 words. Municipal Journal and Public Works, Aug. 30, New York.

Improving Safety and Attractiveness of Electric Street Signs. Portland, Ore., prohibits unsightly electric signs and prevents blanketing. By H. E. Plummer, inspector of bldgs. Portland. 1 ill., 600 words. American City, August, New York.

**Hydro-Electric Plants.**

Hydro-Electric Development on the Seguin River. Municipally-owned plant now being constructed for town of Parry Sound, Ont., to generate from 2,200 to 2,900 H.P.; gravity type concrete power dam. 11 ills., 2,000 words. Canadian Engineer, Aug. 21, Toronto, Ont.

Progress in Water-Turbine Design. Excerpt from annual report of Canadian Electrical Association's committee on prime movers, signed by S. Svenningson (chn.), A. H. Wilson and A. J. McDougall. 1,600 words. Canadian Engineer, Aug. 21, Toronto, Ont.

Water Power Policies of the Quebec Government. Good will of Ontario and federal officials needed to solve some difficult problems; emphytcutic leases from 9 to 99 years; address at annual meeting of Union of Canadian Municipalities. By A. Amos, chief of hydraulic service, Quebec. 2,000 words. Canadian Engineer, Aug. 21. Toronto, Ont.

Progress of Queenston - Chippawa Power Canal. Nearly 5,000,000 cubic yards of earth and rock removed; huge shovel establishes record in loading 8,500 cu. yds. on cars in 20 hours; extensive construction railway handling 200 trains daily; payroll only 1,000 men per shift; construction equipment worth several million dollars. 31 ills., 3,300 words. Canadian Engineer, Aug. 28, Toronto, Ont.

A 32,500-Kwa. Waterwheel Generator. One of the three units under way for Niagara Falls; weighs 300 tons; rotor spider and field ring not integral; reactance 20 per cent. By R. B. Williamson, engr. in charge of alternating-current design, Allis-Chalmers Mfg. Co. 4 ills., 2,100 words. Electrical World, Aug. 30, New York.

Potential Water Power and Coal Saving. Utilization of additional storage sites in New Hampshire would permit generating 490,000,000 H. P. hr. more yearly than is now produced on Connecticut and Merrimack rivers, saving 278,000 tons of coal. 3 charts, 3,000 words. Electrical World, Aug. 23, New York.

Water Power in Maine. Now available at developed sites 226,560 h.p. based on low water flow of streams and at undeveloped sites 143,496 h.p. on same basis. 200 words. Municipal Journal and Public Works, Aug. 16, New York.

Riveted Joints for Steel Penstocks and Formulae and tables for their design; selection of proper type of joint; examples of solution for maximum joint efficiency; discussion of heavier types. By H. A. Babcock and J. R. Montague, Hydro-Electric Power Commission of Ontario. 7 ills., 8 tables, 5,000 words. Canadian Engineer, Aug. 7, Toronto Canada.

**Steam Plants:**

Treatment of Boiler Water for Industrial Plants. Coal economy demands scale prevention; method must be adapted to the water; boiler compounds rarely useful. 1,100 words. Engineering News-Record, Aug. 14, New York.

Factors Affecting Heat Absorption of Boilers. How heat is transmitted; effects of scale and soot and importance of removing or preventing them; tests that prove advantages of mechanical soot blowers. By R. June, mechanical engr. 5 ills., 3,500 words. Electrical Review, Aug. 16, Chicago.

Cooling Condensing Water Helps Generating Capacity. Spray-cooling installation reduces condensing-water temperature, increases vacuum and permits carrying 5,000 Kw. more load. 800 words. Electrical World, Aug. 23, New York.

Pulverized Coal for Boilers. Comparison of stoker with pulverized-fuel plants; comparison on efficiency basis; cost of pulverizing coal. By F. A. Scheffler and H. G. Barnhurst. 4 ills., 3,800 words. Engineering World, Aug. 15, Chicago.

Curing Boiler Trouble Due to Impure Water. Analysis of experiments made in a Kansas City plant that showed how to prevent priming in water tube boilers of vertical-tube type at an average cost of $645 per boiler. By J. N. Helpbringer, supt. of plants, Kansas Gas & Electric Co. 3 ills., 1,100 words. Electrical World, Aug. 9, New York.

**Rates and Finaces.**

Practice in Making Electric Utility Appraisals. Practical methods used in inventory of land, buildings and outside plant; systematic planning of inventory; forms used in gathering field data. By C. W. McKay. 4 maps, 5,000 words. Electric Review, Aug. 9, Chicago.

Central-Station Rates in Theory and Practice. 4th Article. Responsibility for peak load; apportioning demand cost among cutsomers; theoretical division of demand charges based on local curves. 6 illus., 5,000 words. Aug. 2. 5th Article. Apportioning demand charges according to consumers' maximum demands; assumptions as to coincidence with peak load of station and as to actual demand. 6 ills., 5,000 words. Aug. 9. 6th Article. How diversity of demand affects demand cost; diversity-factor defined; mean and weighted averages. 4,500 words. Aug. 16. 7th Article. Consumer cost, what it includes and how it varies; determining numerical values of the three elements of cost; analytical valuation of costs. 4,200 words. Aug. 23. 8th Article. General discussion of price of service; three principles on which price or rate systems may be based; cost, maximum earnings and value of service. 1 chart, 4,000 words. Aug. 30. By H. E. Eisenmenger. Electrical Review, Chicago.

**Gas:**

Legality of a Meter Deposit Upheld in Kansas. Right to require $5 deposit before purchasing gas was upheld by Kansas Supreme Court, providing interest is paid thereon and no discrimination shown. 1,200 words. Gas Age, Aug. 15, New York.

Continuous Process for Distilling Coal Tar. Journal des Usines a Gaz describes plant erected at gas works of Geneva, Switzerland, giving operation results worthy of note. 11 ills., 3,000 words. Gas Age, Aug. 15. New York.

**Miscellaneous:**

Government Operation of Public Utilities. Competition in power field essential to health of electric utilities, otherwise fate of railroads and street railways of country will also engulf central stations. By P. Cabot, of White, Weld & Co., Boston. 1 ill., 3,500 words. Electrical World, Aug. 16, New York.

Chicago's Tunnels for Electric Light and Power Cables. Details of Commonwealth Edison Co.'s tunnels; construction methods employed; relative advantages of tunnels and conduit. By G. B. Springer, C. E., Commonwealth Edison Co. 10 ills., 3,700 words. Engineering World, Aug. 1, Chicago.

## STREET CLEANING AND REFUSE DISPOSAL.

**Street Cleaning:**

St Paul's Street Cleaning and Waste Disposal. Increase in costs last year over those of year before. 1 chart, 700 words. Municipal Journal and Public Works, Aug. 9, New York.

Cost of Street Cleaning at St. Paul, Minn. 500 words. Engineering and Contracting, Aug. 6, Chicago.

**Refuse Collection and Disposal.**

Refuse Collection and Disposal in Hampstead, Eng. Cost of collection by electric truck; street sweepings for private gardens; plant for screening and sorting rubbish. 700 words. Municipal Journal and Public Works, Aug. 23, New York.

Horses vs. Motor Trucks in Refuse Collection. Comparison of cost of maintaining and operating each, from experiences of various cities in their use for this service; cost of operating and maintaining motor trucks in Chicago, Los Angeles, Detroit, Rochester, Philadelphia and elsewhere. 2,700 words, Municipal Journal and Public Works, Aug. 16. 2,300 words, Aug. 23, New York.

Trucks or Horses for Refuse Hauling. Editorial reference to figures given in this and last week's issues; electric trucks found more economical than gasoline in England. 300 words. Municipal Journal and Public Works, Aug. 23, New York.

Refuse Disposal in England. Birmingham has recently set up laboratory for analytical and research work; one feature of salvage work is increasing use of electricity for operating various mechanisms. 800 words. Municipal Journal and Public Works, Aug. 2, New York.

Incinerators Used at Cantonments. Details of design prepared by construction division of army for camp of 20,000 men. 1 ill., 700 words. Municipal Journal and Public Works, Aug. 23, New York.

Collection and Disposal of Refuse in the Future. Choice of wagons; position of ash bins; screening and washing plants. By F. W. Brookman, cleansing supt., Rockdale, England. 3,000 words. Canadian Engineer, Aug. 7, Toronto, Canada.

"Trade Refuse." What it is from legal point of view. 1,000 words. Municipal Engineering and Sanitary Record, Aug. 14, London, England.

Washing Garbage Cans. Device adoped for cantonments for soaking cans and washing with hot water; cans collected and returned clean. 1 ill., 500 words. Municipal Journal and Public Works, Aug. 2, New York.

## TRAFFIC AND TRANSPORTATION.

**Street Railways:**

Status of Electric Railway. Its place cannot be taken by the jitney, but zone fares are desirable. By D. C. Jackson, prof. of electrical engrg., Mass. Institute of Technology. 4,000 words. Electric Railway Journal, Aug. 23, New York.

Revolutionary Change in Public Service Railway Fare System. Mile zone, low initial zone charge and elimination of transfers are important elements in new system. 2,800 words. Electric Railway Journal, Aug. 9, New York.

Hearings for the Public Side Concludes. Federal Commission testimony reflects impression of gross over-capitalization held by public as principal cause of antipathy; general acknowledgment of need for new relations; detailed proceedings. 8 ills., 14,000 words. Electric Railway Journal, Aug. 23, New York.

Advertising and Publicity. Constant advertising properly directed will reduce accidents, assist in improving service and cultivate public good will. By T. T. Wright, auditor, Little Rock (Ark.) Railway & Electric Co. 1,500 words. Electric Railway Journal, Aug. 9, New York.

**Trucks.**

Use of Industrial Electric Trucks and Tractors in Warehouses. Advantages of these in storage buildings and warehouses of all sorts; analysis of handling operations; special advantages for utility service. By B. J. Dillon. 5 ills., 2,700 words. Electrical Review, Aug. 30, Chicago.

Bonus Plan for Motor Truck Operators. Examples of various types that have proved satisfactory given by H. P. Gould, chn., Truck Owners' Conference, Inc., Chicago. 3,000 words. Engineering and Contracting, Aug. 20, Chicago.

Development of Rural Motor Express. From paper at Canadian Good Roads Congress, by F. W. Fenn., secy., motor truck committee, National Automobile Chamber of Commerce. 1,000 words. Engineering and Contracting, Aug. 6, Chicago.

**Water Transportation:**

Building of the Municipal Docks at St. Louis. City and federal governments cooperate in providing better waterway transportation. By M. Serkes, ass't engr., Dept. of Public Utilities, St. Louis. 1,700 words. American City, August, New York.

## FIRE DEPARTMENT.

Fire Department of New York. Organization and equipment of largest fire fighting body in country; admission requirements very rigid; great opportunity for promotion. 1 ill., 2,700 words. Fire and Water Engineering, Aug. 13, New York.

New York Chief's Convention. 13th annual convention of N. Y. State Association of Fire Chiefs, held at Watertown, a great success. 9 ills., 3,500 words. Fire and Water Engineering, Aug. 27, New York.

The International Association of Fire Engineers Proceedings. 4 ills., 2,000 words. Fire and Water Engineering, Aug. 6. 3,000 words, Aug. 13. 3,200 words, Aug. 20. New York.

Private Fire Protection Service. Excerpts from final report of that committee of American Water Works Association; physical questions. 1 ill., 2,800 words. Fire and Water Engineering, Aug. 27, New York.

## GOVERNMENT AND FINANCE.

City-Manager Government. Interesting data concerning the 128 city managers; previous occupation, training, salaries received; achievements in several cities. 700 words. Municipal Journal and Public Works, Aug. 2, New York.

Facts and Figures on City Manager Government. Interesting information given in fifth year book of City Managers' Association. 1,000 words. Engineering and Contracting, Aug. 6, Chicago.

Common errors in Municipal Finance. Crude financial legislation; lack of proper accounting methods; competitive buying. By A. R. Hebenstreit, city manager of Albuquerque. 1,600 words. Pacific Municipalities, August, San Francisco, Cal.

Municipal Bond Boom. Total sale for first seven months of this year never before been approximated. 100 words. Municipal Journal and Public Works, Aug. 16, New York.

## CITY PLANNING.

City Planning for Portland. Commission, organized seven months ago, has prepared zone plans for several districts; zoning the first step, to be followed by street planning; use, height and area districts classified. 5 ills., 2,300 words. Municipal Journal and Public Works, Aug. 23, New York.

City Planning for Portland. Planning major and minor streets; arguments for narrower roadways in minor streets; longer blocks recommended. 2 maps, 1,500 words. Municipal Journal and Public Works, Aug. 30, New York.

Replanning Boston's Most Congested District. Recommendations of city planning board for providing right living conditions in the "North End." By Elisabeth M. Herlihy, secy., city planning board, Boston. 5 ills., 2,000 words. American City, August, New York.

The Linderlea Garden Suburb and Housing Plan, Ottawa. Land acquored by Ottawa Housing Commission and laid out under direction of Dominion town-planning adviser. 1 map, 500 words. Engineering News-Record. Aug. 28, New York.

Engineering Problems of Regional Planning. First requisite is comprehensive survey of topography, geography, population, natural resources, agriculture, industry and trade of the region. By M. Knowles, chief engr., Housing Dept., U. S. Shipping Board. 1,500 words. American City, August, New York.

Amendments to St. Louis Zoning Ordinance Passed. By H. Bartholomew, engr., City Plan Commission, St. Louis, Mo. 700 words. Engineering News-Record, Aug. 28, New York.

The Next Problem in City Zoning. Grading of existing occupancies; awkward cases. From "National Municipal Review," by F. P. Sloan. 2,500 words. Pacific Municipalities, August, San Francisco, Cal.

City Planning for Utility. Editorial urging that city planning be conducted with utility and not adornment as its chief aim. Portland, Ore., cited as latest example of this practice. 200 words. Municipal Journal and Public Works, Aug. 23, New York.

Housing in Relation to Town Development. Certain benefits of combining housing with developments; provision of parks and open spaces. By J. Thomson, city engr., Dundee. Paper before Institution of Municipal and County Engineers. Discussion. 7,000 words. Journal of Institution of Municipal andy County Engineers, Aug. 2, London, England.

New London Housing Project. General plan of procedure in carrying out project, involving $1,250,000; solving some grade problems; street making over mucky land. By L. L. Tribus, of Tribus & Massa, engrs., N. Y. City. 6 ills., 2,200 words. Municipal Journal and Public Works, Aug. 16, New York.

## MATERIALS AND STRUCTURES.

**Concrete:**

Effect of Rodding Concrete. What can be done to repair injury done by excess of water; charts showing increase of strength on concrete due to rodding and variation in the increase. By F. E. Giesecke, prof. of architectural engr., University of Texas, Austin. 2 charts, 1,100 words. Canadian Engineer, Aug. 14, Toronto, Ont.

Concrete and Its Application. Reference to results of experiments carried out under direction of Prof. F. R. McMillan, by Concrete Department of U. S. Shipping Board. 400 words. Municipal Engineering and Sanitary Record, July 31, London, England.

Further Criticism of Fineness-Modulus and Surface-Area Methods. Letter to editor from G. M. Williams and Watson Davis, U. S. Bureau of Standards, Washington, D. C. 3,200 words. Engineering News-Record, Aug. 14, New York.

Efficient Plant for Casting Concrete Blocks for Miami River Revetment. 4 ills., 1,300 words. Engineering and Contracting, Aug. 20. Chicago.

**Bridges:**

Cofferdam Experience at a Bridge in Chicago River. Flooding due to inaccurate record of old tunnel; movement of wall in deep water leads to heavier construction. By H. E. Young and Wm. A. Mulcahy, engr. of bridge design and engr. of construction, Chicago. 2 ills., 1,300 words. Engineering News-Record, Aug. 7, New York.

Flat Arches on High Piers, South Side Bridge, Fairmont. More economical of two alternate designs is adopted; special falsework used for salvage; costs affected by war conditions. 7 ills., 2,500 words. Engineering News-Record, Aug. 7, New York.

Electricity Cuts Construction Plant Power Costs. Plant for large arch-bridge construction motor-operated; motor generator permits use of high-tension current. 3 ills., 1,000 words. Engineering News-Record, Aug. 14, New York.

Extraordinary Repairs Made to a 1,900-Ton Drawbridge. Turntable, wheels and drum failing, the number of wheels was increased and new upper treads placed; drum parts restored by heating and jacking. By T. D. Fulton, field engr., Bethlehem Steel Bridge Corporation, Bethlehem, Pa. 7 ills., 3,000 words. Engineering News-Record, Aug. 21, New York.

Rondout Creek Bridge Design Condemned for Excessive Load on Batter Piles. State highway commissioner considers pier foundation dangerous and superstructure design not adapted to site. 3 ills., 3,300 words. Engineering News-Record, Aug. 14, New York.

Cross-River Traffic Problems at Portland. Situation of bridges; subway a possibility; data on existing bridges. By W. A. Scott. 2,300 words. Engineering World, Aug. 15, Chicago.

Repairing Masonry Bridge Piers. With the Cement Gun. 2 ills., 450 words. Engineering World, Aug. 1, Chicago.

**Tunnels:**

Proposed Types of Vehicular Tunnel Under Hudson River. Brief history of New York-New Jersey tunnel project; traffic estimates; details of plans being considered. 2 ills., 1,500 words. Engineering News-Record, Aug. 28, New York.

Municipal Tunneling Has Become Commonplace. Editorial reference to tunned under East River for which excavating was completed Aug. 7; carrying streets through hills. 300 words. Municipal Journal and Public Works, Aug. 23, New York.

## MISCELLANEOUS.

Labor Saving Methods Demanded. Editorial reference to paper before Institution of Municipal and County Engineers entitled "Some Lessons and Problems"; numerous types of mechanical loaders used in United States; joint ownership of costly plants by several authorities. 500 words. Municipal Engineering and Sanitary Record, July 31, London, England.

Foundations in Quicksand and Watery Gravel. Wells lined with wood and steel sheeting; heavy pumping required; motor trucks handle excavation and concrete. 2 ills., 1,100 words. Engineering News-Record, Aug. 28, New York.

Clamshell Bucket Digs 30 Cubic Yards per Dip. Largest bucket of this type ever built; record of 24,000 cubic yards of material in 20 hours. 2 ills., 400 words. Engineering News-Record, Aug. 7, New York.

Largest Use of Electric Power on Construction Work. Dayton flood protection works use 8,000 HP. from central plant, in motors of 5 to 500 HP., for pumps, excavators, concrete mixers and other equipment scattered over 1,000 square miles. 5 ills., 3,200 words. Engineering News-Record, Aug. 28, New York.

Features of Electrically Operated Hydraulic Dredge. Description of dredge owned and operated by city of Oakland, Cal.; advantages of electric drive and savings effected; central-station service is used. By C. W. Geiger. 4 ills., 1,400 words. Electrical Review, Aug. 16, Chicago.

Can the Contractor Assign His Contract? Legal decisions setting forth conditions under which contracts for municipal improvements can be assigned.

(*Continued on page 178*)

# NEWS OF THE SOCIETIES

**Sept. 15-17.**—NATIONAL ASSOCIATION OF WASTE MATERIAL DEALERS. Annual convention, New York, N. Y.

**Sept. 23-26.**—INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. Annual convention, Chicago, Ill. Secretary, Clarence R. George, Houston, Tex.

**Sept. 30-Oct. 1-3.**—NEW ENGLAND WATERWORKS ASSOCIATION. Annual meeting. Albany, N. Y. Secretary, Tremont Temple, Boston, Mass.

**Oct. 1-4.**—NATIONAL SAFETY COUNCIL. Eighth annual congress, Cleveland, Ohio.

**Oct. 21-24.**—ILLUMINATING ENGINEERING SOCIETY. Annual convention, Chicago, Ill.

**Oct. 27-30.**—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting. New Orleans, La. Secretary, A. W. Hedrich, 169 Massachusetts ave., Boston, Mass.

**Nov. 12-14.**—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans. La Secretary, Charles C. Brown, Springfield. Ill.

**Feb. 9-13, 1920.**—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention, Louisville, Ky. Secretary, E. L. Powers, 150 Nassau street, New York.

### American Public Health Association.

Following is the preliminary program of the Sanitary Engineering Section of the American Public Health Association which is to be presented at the New Orleans meeting, October 27-30.

The following committees will report under the chairmen named: Water Supply, G. G. Earl; Waterworks Operation and Analytical Methods, Edward Mayo Tolman; Sanitary Control of Waterways, Harrison P. Eddy; Sewerage and Sewage Disposal, Kenneth Allen; Sewage Works Operation and Analytical Methods, C. B. Hoover; Refuse Collection and Disposal, E. D. Rich; Milk Pasteurization, H. A. Whittaker; Swimming Pools, G. W. Simmons, Jr.; Constitutions, Samuel A. Greeley.

The following papers will be presented:

Water Supply and Typhoid Fever. (Title tentative.) Col George A. Johnson.

Operating Features of St. Louis Waterworks. (Title tentative.) E. E. Wall.

Control of Water Purification Plants in Ohio. W. H. Dittoe.

Typhoid Fever Outbreak in Charleston, W. Va. (Title tentative.) Edward Mayo Tolman.

The Engineer in Public Health Work. (Title tentative.) Morris Knowles and Maurice Scharff.

Langdon Pearse and S. A. Greeley.
Paper. (Title not yet submitted.)
Sanitary Engineering Practices in Europe. (Title tentative.) Thorndike Saville.

Paper. (Title not yet submitted.) Frederick Bass.

Paper. (Title not yet submitted.) Charles Saville.

### The North Carolina Society of Civil Engineers.

The North Carolina Society of Civil Engineers held its first annual convention at Wrightsville, Aug. 22-23. Col. Joseph Hyde Pratt, U. S. A., spoke on "Lessons Learned from Roads in France." There was also a discussion of North Carolina drainage problems and highway construction.

### American Association of Engineers.

On August 26, Dr. F. H. Newell, president of the American Association of Engineers, addressed the Engineers' Club of San Francisco. The following night he spoke at a meeting held under the auspices of the San Francisco Chapter of the A. A. E., in the San Francisco Commercial Club, which was open to all engineers. On August 30 Dr. Newell spoke in Los Angeles before the Los Angeles Chapter and the Engineers' and Architects' Association of Southern California; on the 31st at San Diego; at Yuma, Ariz., on September 2 and at Tucson on the third.

On August 26th Major Garrison Babcock, past president of the American Association of Engineers, installed in Toledo, Ohio, the Toledo Chapter of A. A. E. This installation was unique in that it was carried out by means of a formal installation ceremony which tended to impress upon the candidates the necessity for Americanism, ethical engineering practice and the citizenship and professional obligations of the engineer. The ceremony included in full the American's Creed, the Engineer's Code of Ethics, and the objects of the American Association of Engineers.

The results of the recent referendum held by the American Association of Engineers on the distribution of expenses among ten various activities of the Association indicate that of all the things which the members believe to be important, the employment service is the most popular. The referendum was recently completed and the total vote indicated a desire on the part of the members to have about seventeen per cent of the income of the association spent on employment. It is interesting to know that compensation was second with about sixteen. The official publication, promotional work, publicity, legislation, protection and prevention of abuses, membership, civic welfare, and ethics and practice were next in the order named. It is interesting to note that mining engineers voted the greatest percentage to employment, while the least percentage voted to employment was by those engineers employed by educational institutions. Government engineers voted more to be spent on publicity than any other class. The greatest desire for development of the organization appears to lie in the educational group; for these engineers voted three per cent more for promotional work than any other class of members. Engineers employed by public utilities voted the greatest amount to be spent on legislation, although those employed by states ran a close second. Legislation was least desired by government engineers, who voted a full three per cent less than those employed by public utilities. Engineers in private practice voted the greatest amount to be spent on civic welfare work; the least amount voted to this work was about three per cent voted by mining engineers. Engineers in private practice voted a greater amount to be spent on protection and prevention of abuses than any other class of members. Municipal engineers voted the most money to be spent on compensation, while railroad engineers, engineers in public utility work and engineers employed by states following in the order named.

The complete tabulation of the ballot follows:

| Activities | Per cent voted to be spent |
|---|---|
| Employment | 17.4 |
| Compensation | 16.3 |
| The Monad | 14.8 |
| Promotional Work | 10.9 |
| Publicity | 9.8 |
| Legislation | 8.8 |
| Protection and Prevention of Abuses | 8.1 |
| Membership Campaign | 5.8 |
| Civic Welfare | 4.5 |
| Ethics and Practice | 3.6 |
| Total | 100.0 |

Many chapters and clubs of the American Association of Engineers everywhere are taking action on legislation. The Townsend Bill, providing for a well organized system of highway development, has received the favorable vote of a great many of these local organizations, including those at St. Paul, Minneapolis, San Francisco, Muskogee (Okla.), Pittsburgh, Chicago, Chattanooga and Indianapolis. Chapters and clubs are taking a great interest in state and community legislation. The Baltimore Chapter has requested the Governor to appoint an engineer to the public service commission of Maryland. The Pittsburgh Chapter has inaugurated the practice of investigating the qualifications of candidates for such offices as county commissioner and making public its reports on the qualifications of the various candidates. The Fresno (Cal.) Club has issued a special notice to the public setting forth the necessity for an affirmative vote on a bond issue to provide additional funds required to make a deficit in the county treasury. Everywhere there is being developed a strong interest in local politics.

On August 22nd, Dr. F. H. Newell, president of the American Association of Engineers, assisted the engineers in city service in Portland, Ore., in their attempt to obtain increased compensation, by appearing before the mayor and the city council in advocacy of the increase. He spoke at length upon the necessity for adequate compensation and upon the methods of the American Association of Engineers.

### New England Water Works Association.

The thirty-eighth Annual Convention will be held in Albany, N. Y., September 30, October 1, 2, 3, 1919, with headquarters at Hotel Ten Eyck. As there are other good hotels near headquarters, there will be no lack of good accommodations for all attending this Convention.

Arrangements have been made with the hotel for ample room for exhibits and business meetings.

The Water Works Manufacturers Association is making elaborate preparations to entertain the members and their guests. Special effort will be made to entertain the ladies during the business sessions.

Under the direction of A. B. Coulters and Burt B. Hodgman, the manufacturers and supply houses are making an unusual effort to have an attractive and interesting exhibit.

The committees have renewed their activities during the past few months and some important progress reports will be made.

The literary program, which has been solicited and arranged by Charles W. Sherman, will be very interesting and instructive. The program, which will be submitted in full later, is in part as follows:

The Operation of and Purification Effected by the New Drifting Sand Filter System at Toronto; by Norman J. Howard, bacteriologist in charge, Toronto filtration plant, Toronto, Ont.

Swimming Pool Management; by William P. Mason, Professor of Chemistry, Rensselaer Polytechnic Institute, Troy, N. Y.

The Supervision of Public Water Supplies by the N. Y. State Dept. of Health; by Theodore Horton, chief engineer, N. Y. State Dept. of Health, Albany, N. Y.

Schoharie Development of the New York Water Supply; by J. Waldo Smith, chief engineer, Board of Water Supply, New York, N. Y.

Water Supplies for the American Expeditionary Forces; by Col. Francis F. Longley, consulting engineer, New York, N. Y.

Watershed Leakage; by Robert E. Horton, consulting engineer, Voorheesville, N. Y.

Hydraulic Fill Dams of the Miami conservancy District; by H. S. R. McCurdy, division engineer, Miami Conservancy District, Englewood, Ohio.

The 10-Million Gallon Covered Reservoir of the Dayton Water Works; by Leonard Metcalf and William T. Barnes, consulting engineers, Boston, Mass.

Dangerous Reduction to Insulation Resistance in High Pressure Fire Service Motors Due to Moisture; by William W. Brush, deputy chief engr., Dept. of Water Supply, Gas & Electricity, New York, N. Y.

Detection of Losses from Underground Piping Systems; by Paul Lanham, engineer in charge of waste detection, Washington, D. C.

Experience in Metering Fire Services; by Frederic E. Beck, chief engineer, Consolidated Water Co., Utica, N. Y.

Painting Standpipes; by Charles W. Sherman, consulting engineer, Boston, Mass.

Pumping Engines for Small Water Works Plants; by Creed W. Fulton, N. E. manager, The Goulds Mfg. Co., Boston, Mass.

Tests of the Uniflow Pumping Engine; by D. A. Decrow, manager W. W. Dept., Worthington Pump and Machinery Corporation, New York, N. Y.

Guaranties or Assessments for the Extension of Main Pipes; by Bertram Brewer, assistant engineer, State Department of Health, Boston, Mass.

## PERSONALS

As officer in charge of the water-supply section of the Division of Construction and Forestry of the A. E. F., Lieutenant Colonel Wiggin had general supervision over all of the water-supply projects in the zone of the Services of Supply. Among the works constructed were a curved dam at Savenay, and important additions to the water-supply systems at Brest and St. Nazaire, the main embarkation centers for the American Army in France. Water supplies also were installed at all of the big hospital centers, and some of them, such as those at Mars and Mesves, with 20,000-bed capacities, represented full-sized cities.

In recognition of his work as officer in charge of the water-supply section, Lieutenant Colonel Wiggin, last April, received from the Commander-in-Chief, A. E. F., a citation for "exceptionally meritorious and conspicuous services."

Edy, John N., formerly assistant chief engineer of the Montana State Highway Commision, has been appointed chief engineer of the commission, succeeding Paul D. Pratt.

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## THE MUNICIPAL INDEX.

(*Continued from page* 176.)

By J. Simpson. 2,500 words. Municipal Journal and Public Works, Aug. 16. New York.

Reconstruction of the Naches-Selah Irrigation Canal. Parts of old Sidehill Canal in disrepair replaced, under war conditions, by concrete-lined tunnels, reinforced-concrete flumes, and canal with wire-reinforced concrete. By E. M. Chandler, chief engr., Yakima, Wash. 4 ills, 3,400 words. Engineering News-Record, Ang. 7, New York.

Some Causes of Breakdown to Electrical Machinery. Deterioration of insulation due to dirt, mechanical stresses, etc.; ventilation, metal fatigue, bearings and other causes of trouble; typical examples of breakdowns met in industrial plants. By W. C. Worral. 6,500 words. Electrical Review, Aug. 23, Chicago.

National Chaos in Our Rivers. Do we need a national department of public works? By M. O. Leighton. 1.000 words. Engineering World, Aug. 15, Chicago.

Refrigeration in Its Relation to the Municipal Power Plant. By J. V. Martenis, ass't prof. of mechanical engrg., University of Minnesota. 1,100 words. American City, August, New York.

World Is on Higher Price Level. Relation of price and cost; purchasing value of dollar; maximum level not yet reached; prices of building materials. Abstract of testimony submitted to Public Utilities Committee of Chamber of Commerce, U. S. 4.500 words. Canadian Engineer, Aug. 14, Toronto, Ont.

Classification of State, County and Municipal Salaries. Engineering council committee formulates scheme as basis for inquiry into needed changes in compensation of engineers. 1 ill., 200 words. Engineering News-Record, Aug. 21, New York.

Lessened Purchasing Power of Public Utility Earnings. Under changed economic conditions should public utility valuations and returns be increased over pre-war basis? By W. H. Winslow, Superior, Wis. 1,300 words. Electrical Review, Aug. 23, New York.

State Purchasing Agents. Invitations to a meeting at Madison, Wis., have been extended by the secretary of Wisconsin to secretaries of other states, for purpose of discussing advantages of state purchasing agents. 200 words. Municipal Journal and Public Works, Aug. 2. New York.

Government Study of Municipal Markets. According to study made by Bureau of Census of Department of Commerce, they have taken firm hold on American people. 1,000 words. Pacific Municipalities, August, San Francisco, Cal.

Allentown's City Farm and the High Cost of Living. Products of farm sold to city markets and on streets at reasonable prices. 600 words. Municipal Journal and Public Works. Aug. 23, New York.

The Housing Situation. Abstract from address before Senate by Senator Wm. M. Calder outlining purposes of bills before Congress designed to relieve great national shortage of housing facilities. 1,500 words. Engineering and Contracting, Aug. 27, Chicago.

Methods and Cost of Valuing Real Estate in Davenport. From address by W. T. Waterman before Contemporary Club of Davenport. 800 words. Engineering and Contracting, Aug. 6, Chicago.

Outlook for Research in America. Superficial invention vs. scientific research; French and English as compared with German technologists; research efficiency vs. protective tariff and boycott; few profound thinkers during last 300 years. By N. M. Hopkins., Ph.D., research engr., Washington, D. C. 4,300 words. Engineering and Contracting, Aug. 27, Chicago.

Timely Census Reports. Radical changes made in bureau in the last few years and reports have been issued more promptly. 150 words. Municipal Journal and Public Works, Aug. 30, New York.

Proposed Changes in American Institute of Electrical Engineers. Suggestions by development committee and comments of members who have studied them; danger seen in downward change of Institute standards and activities in engineering and research. 2,500 words. Electrical World, Aug. 2, New York.

Enhancing Prestige of the Institute of Electrical Engineers; Activities which should not be undertaken; original professional papers and reviews of the state of the art desirable; comments of Institute publications. By Dr. C. P. Steinmetz. 4,200 words. Electrical World, Aug. 2, New York.

Comments on Proposed A. I. E. E. Changes. Points to be considered by board of directors at its August meeting; opinions of members on changes proposed; need of wider publicity on plans that have been formulated. 4,000 words. Electrical World, Aug. 9, New York.

Additional Comments on A. I. E. E. Changes. Suggestions for work of engineering congress by Past-President Stillwell; comments on papers and publications by Dr. Louis Bell; other discussions on changes proposed by development committee. 5,000 words. Electrical World, Aug. 16, New York.

A. I. E. E. Affairs Still Provoke Discussion. Dr. A. E. Kennelly condemns popularization idea; Wm. Arthur criticises type of papers now printed; other comments on development committee report. 2,500 words. Electrical World, Aug. 23, New York.

Shall Institute Practices Be Amended? Members of A. I. E. E. display growing interest in development committee's recommendations; communications from Elihu Thomson and others deal with question from all points of view. 1,700 words. Electrical World, Aug. 30, New York.

# Municipal Journal & Public Works.

City County State

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## SCHOOL BUILDING PROGRAM.

The Bureau of Education, Department of the Interior, gives the following as the questions that must be answered before a city can prepare a properly planned school building program:

What is the present school population?

How much has it increased in the past 8 or 10 years?

Where is the congestion greatest?

In what direction is the tide of population moving?

What kind of buildings should be put up and in what parts of the city in order to provide for growth as well as for present enrollment?

How much playground space is needed?

What kind of activities should be provided in the school buildings in order that the children shall grow to be healthy, intelligent, self-reliant, and worthy to carry on the traditions of the city?

Considering the funds available for building purposes in the present and in the immediate future, what items in a comprehensive building program should be taken up first, and what items can be left for future building appropriations?

In addition, it may be said that new school buildings are seldom finished and equipped by the beginning of the fall term, and that consequently they should be started earlier than they are. Buildings for next year should be planned at once and started this fall or, if small, the first thing in the spring.

## PUBLIC EMPLOYMENT THAT IS A PUBLIC TRUST.

Several summers ago the garbage-collecting employes of New York City went on strike and the city was threatened with a pestilence from huge piles of garbage which collected in the streets. A few days ago the police of Boston went on a strike and the city was threatened with all the damages that would result from the unrestrained acts of criminals, rowdies and thoughtless boys. At the time it was intimated that the fire department forces might begin a "sympathetic strike," also the electric lighting employes.

It takes something of this kind to bring home to us a realization of how important certain classes of public employes are to the very existence of a city. Necessary as are the police, the firemen are even more so. Not more than two or three per cent of the population need police restraint, and the remainder could easily organize temporarily for mutual protection. But let a fire get out of hand while firemen are on a strike, and the whole city might be wiped out.

If, during the police strike, the employes of the lighting companies had gone on strike and the streets had been left in total darkness, the danger would have been increased many fold. Even with the police on duty, crime could with difficulty be prevented in dark streets.

And suppose, in a city with a direct-pumping water supply, whether municipally or privately operated, the employes at the pumping plant should strike and prevent others from taking their places. The danger from fire above referred to would exist, and in addition, water for drinking, cooking, flushing toilets and other essential needs would be unavailable. The city might burn down, filth would unquestionably accumulate and an epidemic of typhoid and other filth diseases would be almost certain to follow; while every citizen would suffer inconvenience and hardship.

Not only comfort and safety, but life itself in a large city depends upon the continuous performance of their duties by certain classes of men; and these are not always employed directly by the city, as in the case of private water works or street lighting companies, or garbage collecting by contract. For such men to refuse to serve is a crime against their fellow citizens and cannot be tolerated. Also, for them, as a class, to form close affiliations with any other one class of people, be they employers, employes, socialists, prohibitionists, or what not, is to imperil democratic principles and government and cannot be permitted.

On the other hand, people should realize that such employes are especially essential to their personal well-being, and that, as they are in honor bound to continue the performance of their duties without thought of ceasing, so is the public in honor bound to see that they are suitably paid for such services and that the conditions under which they perform their duties are made as agreeable as possible, in view of those under which other citizens are working at the same time. No man's hours and pay are satisfactory to him for long, but there should be no just cause for discontent with either in the case of the classes of public servants referred to.

There is much that should be improved in the relations between the public and such employes and, regrettable as it is, the Boston police strike may serve to call attention to this and lead to understandings in cities throughout the country that will be better for both public and employes.

That many of the latter realize their duties to the public is being made evident, and gives promise of readily reaching such an understanding. For illustration, The Uniformed Officers Association, of the New York Fire Department, on September 15th adopted resolutions stating that "The members of the uniformed force of the Fire Department being public officials serving as a force of public safety, we believe that any attempt of an organized effort on the part of such force to engage in a strike under any circumstances would be akin to mutiny and desertion of posts in time of danger, which would not only result in an undue menace to the lives and property of the citizens of the city, but would also be an unlawful proceeding and a crime against civilization and government." Also, that they believed that the citizens will "provide for the proper administration of our department and in recognition and appreciation of the service w render, will, at all times, consider and decide with justic all matters affecting our material conditions and welfare"; and that they "hereby pledge to the officials of the cit and to our employers, the people of the city, that w shall stand faithful to the trust imposed in us and to ou oath of office, unswerving in our devotion to duty as members of the uniformed force of the Fire Department, t protect and preserve our city and government, our department, and the lives and property of the community."

Men who hold such sentiments are not mere employe —they are citizens in offices of public trust, in appointin them to which the city is honoring them with its confidence as picked men especially worthy of such trus Let both men and public realize this and act accordingl and there will be no thought of strikes by such men no unjust treatment by the city in either the pay or cond tions of service provided for them.

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# STREET CLEANING AND REFUSE COLLECTION IN NEWARK

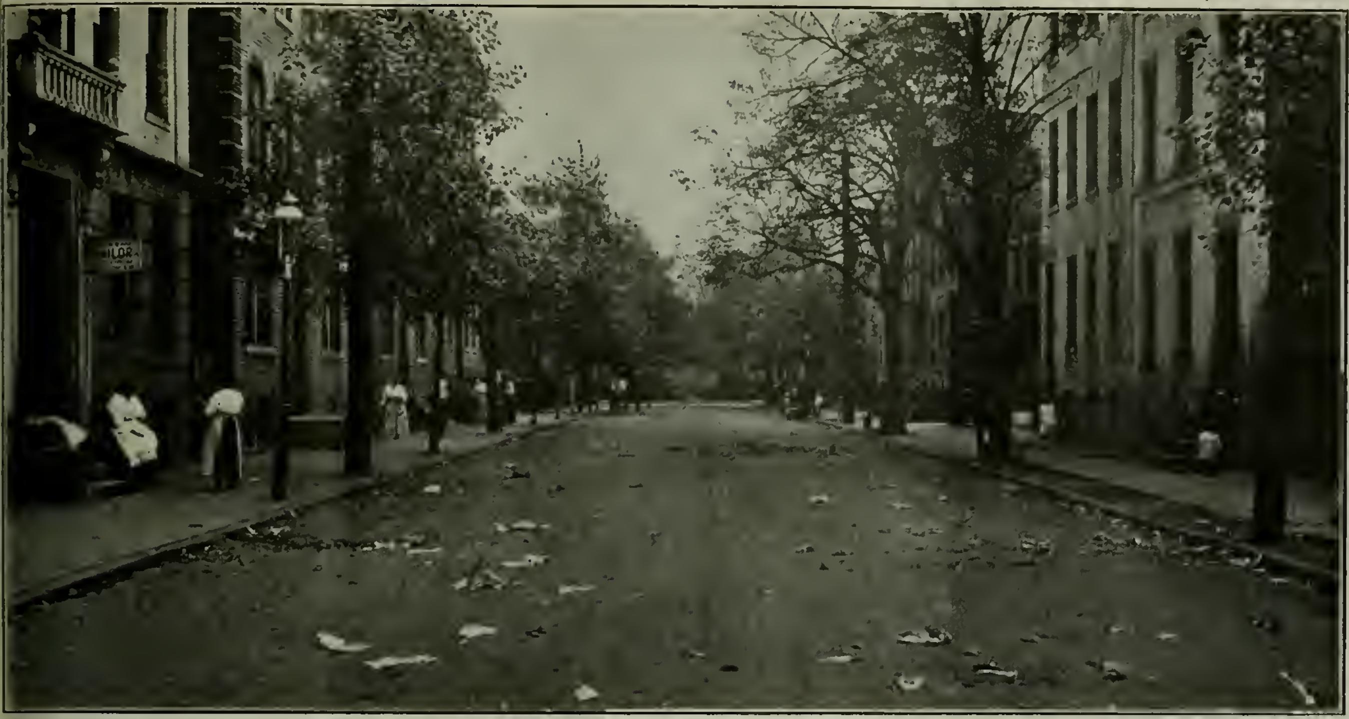
### Appliances, Methods and Organization in a Large Manufacturing and Commercial City—Cleaning by Moto Flushers, Machine Brooms and Hand—Private and Municipal Collection — Meadow Dumps—Pig Farm.

The service of street cleaning and refuse collection in the city of Newark, New Jersey, has, during the past few months, been undergoing a development which promises to make it among the most effective to be found in any city in the country. The director, Thomas L. Raymond, becoming convinced last year that this service is perhaps the most difficult as well as the most important of those which a city government is called upon to render, decided to endeavor to improve the nature of the service rendered in Newark. With this in view, he decided to obtain an experienced and competent man to take charge of the work under the title of "engineering supervisor," and a competitive examination was held, open to citizens of any part of the United States. Several applicants were examined and the highest grading was given to James W. Costello, who was then division engineer of the Bureau of Street Cleaning of Philadelphia. Mr. Costello was appointed to the position in December, 1918, and immediately began taking steps to develop the service into one adequate for a progressive city of nearly 500,000 population. We are indebted to Mr. Costello for the information contained in this article.

STREET CLEANING.

For cleaning the streets the city uses two mot flushers, fourteen machine brooms, and six snow plov for winter use, to be hauled by the flushers. In additic to the drivers of these, about two hundred men (tl number varies from day to day) are used in hand wor either as "patrol" or "block" men, or for collecting tl dirt brushed into winrows by the machine brooms flushed into the gutters. Of these men about 140 a regulars, while 60 or more are carried as extra men, tl number of which employed from day to day depen upon the requirements of the service, the weather co ditions, etc.

Although there are but two motor flushers, each these works sixteen hours a day in two 8-hour shifts, a thus does the work of four machines. Mr. Costello in favor of flushing for a considerable part of the str cleaning and hopes to have six more motor flushers service next year. Each flusher is operated by two m a driver, who also keeps the records of area cover time of filling tank, etc., and a helper who regulates t flushing valves. For roadways forty feet wide or le the flusher cleans from gutter to gutter in one trip, l



A STREET IN THE ITALIAN DISTRICT OF NEWARK BEFORE FLUSHING.

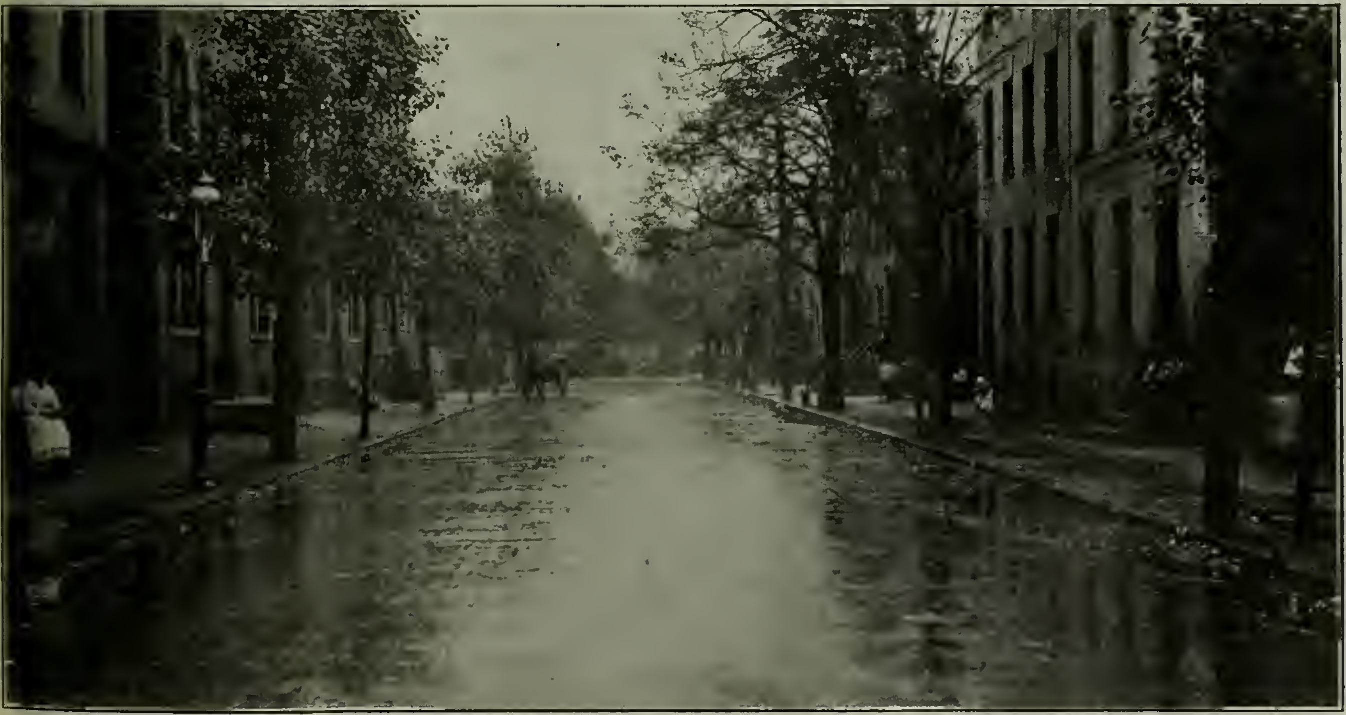
for wider streets two trips are made, each flushing toward one gutter only. Where there are street railways, the railway space ordinarily is not flushed, chiefly because the pavement in the railway strip does not permit of flushing successfully.

All the streets of the city whose pavements permit it are flushed at least once a week. The main streets in the business section are flushed three times a week, during the night time. These streets are also served by block men during the day, these men being on duty from 7:30 a. m. to 4:30 p. m., with one hour for dinner. Their first duty on coming in the morning is to clean from the gutters the dirt deposited there the night before by the flushers.

The flushers clean an average of 350,000 square yards in the two shifts each day, or 175,000 square yards in eight hours, as compared to 80,000 square yards cleaned in the same time by machine brooms.

There are fourteen machine brooms in service, which also are used in all parts of the city. Each broom is driven by one man and followed by a gang of eight men which sweep the winrows into piles, and these in turn are followed by two or three collecting wagons, the drivers of which shovel these piles of dirt into the wagons, occasionally assisted by a man from the broom gang when this is necessary.

There are 55 block men, located in the streets of the business district and the business streets of the outlying



THE SAME STREET AFTER FLUSHING.

NEWARK'S TWO MOTOR FLUSHERS.

districts. The area covered by each block man varies from 7,500 square yards in the congested district to from 12,000 to 15,000 square yards in the outlying districts. The block men do not use cans and can carriers, as is the practice in many cities, but the dirt collected by the brooms and scrapers is pushed over the pavement to and shoveled into boxes placed along the curb. These boxes are located about 100 to 125 feet apart on each side of the wide main streets in the business district, and at similar or somewhat greater intervals along one side of the other streets. These boxes are made of No. 18 gauge galvanized sheet iron, with a flat lid of the same material hinged to one side, and provided with a handle on each end. The box is 2 feet 6 inches by 16½ inches, by 15 inches high. While they cannot be claimed to be ornamental, the boxes at least are not so unsightly as the cans used ordinarily, and the shape prevents their being tipped over and thus littering the street, while the cover prevents their contents from being blown about. Most of the sidewalks where they are used are of generous width, so that the 18 inches of sidewalk width occupied does not interfere with the pedestrian traffic. The boxes are not ordinarily placed nearer a street corner than about twenty-five feet. At each corner there is usually a trash can with a half-open hood similar to those used in New York City, which is stationed alongside the box. The sweepings are all placed in these boxes, from which they are collected by collecting wagons at frequent intervals.

While the ashes and rubbish collected by the department have to be hauled a long distance to dumps on the meadows, the street dirt can usually be disposed of by a short haul, a great deal of it being used as fertilizer for gardens and by the park department.

The horses used for the carts and brooms are owned by the city and kept in two stables, one containing forty horses and another eleven horses. It is hoped (as will be referred to later) to establish two or three city stables in which can be housed all the horses used both for street cleaning and for refuse collection.

### REFUSE COLLECTION AND DISPOSAL.

In 1915 the city made a contract, to run for five years, for the collection of garbage, ashes and rubbish, the same to be kept separate by the householders. After a few months, the contractor claimed that the refuse was so insufficiently separated that he was unable to utilize the garbage and salvage rubbish materials as he had intended and could have done had the city secured the proper separation, and he abandoned his contract. The city then took over the collecting service, acquiring the contractor's wagons, and has since extended the collecting plant, but does not own the horses for use in connection with the wagons, hiring these with the drivers at a fixed amount per day. Until quite recently the amount paid was $8 a day but horse owners are now asking $10 per day and the city has had no alternative but to pay this, although correspondence with many other cities of approximately the same size indicates that $6, $7 or a maximum of $8, is the price paid by them. The city collected all the rubbish mixed and carried it to dumps on the meadows, where the material was used for grading streets over this low land. A contract was made by which the privilege of sorting over this mixed refuse was granted to a contractor, who in turn kept the fills in condition, leveling them off and furnishing such labor as was necessary on the dumps, thirty men being provided at the three dumps. In addition, the contractor paid the city $3,000 for the privilege of salvaging whatever was possible.

On July 3rd of this year the city let a contract to the National Utilization Company for a period of five years beginning September 1st, under which contract the city delivers the garbage to a piggery located within city limits about a quarter of a mile from the Passaic river. The company is to pay the city for each ton of garbage delivered eight times the price per pound of live killing hogs on the Chicago market, this price being determined by averaging the top price for each month. The city agreed to enforce the existing ordinance so as to effect a good primary separation of the garbage and also agreed to endeavor to pass ordinances whereby the contractor will receive all hotel and restaurant garbage. In March of this year a new ordinance had been introduced requiring the separation of refuse into ashes, rubbish and garbage, and at the present time such separation is being secured with fair effectiveness in about 45 per cent of the area of the city. A police officer and inspector are assigned to each district to enforce this ordinance. Within a few months, by the time the garbage contractor is ready to receive all of the garbage of the city, it is expected that separation will have been made effective over the entire area.

In studying the problem of garbage disposal, a reduction plant of 150 ton capacity was contemplated, but the idea was abandoned in view of the present cost of building, an estimate received from one company being $750,000 exclusive of the site. It was then concluded to endeavor to make satisfactory arrangements for feeding the garbage to pigs, with the result already described. It is estimated that five thousand hogs will be required to consume the entire garbage of the city during the peak months. The National Utilization Company are planning to use intensive methods. The hogs will be housed in buildings, each unit being 100 by 100 feet and accommodating from 800 to 1,000 hogs. One such building is already in use containing about 900 pigs. Three such buildings are already completed and it is expected that a second will be filled with pigs by the end of this month. A double concrete driveway and feeding floor 24 feet wide extends through the center of each building with a gutter on each outer edge next to the pens. These gutters discharge into large grease traps to prevent solids reaching the sewer. On each side of the driveway are five pens which have a slight pitch towards the gutters. Each pen is equipped with an automatic drinking fountain. Each opens into a yard fifty feet deep in which the pigs may have outdoor exercises. The houses are of saw tooth construction with windows the entire length below the eaves and in the peak, making them both light and sanitary.

*To be concluded.*

# SURFACING OLD GRANITE BLOCK PAVEMENT.

## Method Employed in Jersey City, Using Asphalt, Screenings and Sand.

By CHARLES E. MURPHY.*

What to do with old, worn granite block pavement is a question confronting many municipal engineers of the country today. There is too much invested in the granite block pavement to tear it up and relay; and labor cost, particularly in the east, temporarily prohibits the taking up, reclipping and relaying the granite block. Jersey City has solved the problem on Pacific Avenue by developing a very unusual method of surface treatment with asphalt which apparently is proving successful from every standpoint. By this method the old granite block pavement, which is a very substantial base, is made smooth and noiseless and after all more durable at a very reasonable cost. In fact, the cost is such that retreatment can be made when required, similar to stone road maintenance.

On of the features of this treatment of granite block is the ease and facility with which the work is done. As the initial step, the granite block pavement is thoroughly flushed with water and made clean. This first phase of the work may seem on the face of it a mere perfunctory operation, but in reality it is highly important, as the presence of dust and dirt prevents perfect adhesion of the surfacing materials. Following the flushing, the pavement is allowed to dry, after which a coat of asphalt is applied to the old granite block by an automobile pressure distributor.

It is advisable in this process to use an asphalt with penetration between 90 and 100. The asphalt is applied in sufficient quantity to fill the interstices and to thoroughly flush the blocks. Upon the asphalt flush-coat sufficient ¾ inch trap rock is spread to take up the asphalt and form a uniform layer on the old block. The pavement is then thoroughly rolled with a ten-ton roller until it assumes the appearance of an asphalt-macadam pavement. Upon this surface a seal coat of the same grade of asphalt is spread and covered with sharp, coarse sand until all excess asphalt is absorbed. The pavement is then rolled again, preferably with a lighter tandem roller, until the surface is smooth. Sand is spread either by hand or with a mechanical sand spreader. Where soft spots appear after rolling, more sand is spread in this layer until the asphalt ceases to come up through the surface. Under traffic the pavement soon takes on the appearance of a sheet asphalt pavement.

There are many desirable features about this process of surface-treating granite block pavements. One is the fact that the street is not closed to traffic during the process. While one side of the street is being surface treated, the other side accomodates the traffic. Furthermore, the new surface is ready for traffis immediately after completion. The height of curb often prevents the laying of a sheet asphalt or asphaltic concrete pavement, but by this method the curb height is so slightly reduced that it will not materially affect drainage.

The simplicity of this method of prolonging the usefulness of the granite block street makes it practical for even the smallest community. It is not necessary to have an asphalt plant and the labor required is much less than if the street was resurfaced with a hot-mix asphalt top. If a sand spreader is used instead of spreading by hand, only three or four laborers are necessary. This method of construction can be carried on at a very rapid rate so that the new surface of the entire width of the street is ready for use within a day or two after the work is started. This is an important consideration on a congested city street.

The popularity of the new surface on Pacific Avenue is demonstrated by the fact that prior to treatment there was little or no automobile traffic on the street, and immediately after construction had been completed the street became popular with automobile drivers.

This method was developed by Charles A. Van Kuren, city engineer of Jersey City. The contractors were Earle Lansdell Co. of Hackensack, N. J. Texaco 96 paving cement was the binding medium used.

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*With Asphalt Sales Department, The Texas Company.

# TO PREVENT STREET LITTERING.

Probably the most difficult problem presented to the Bureau of Street Cleaning in New York is keeping the streets and sidewalks even passably clean in the lower east side of the city, where push-cart peddlers swarm by the thousands. There are in the city approximately six thousand push-carts from which goods of every description are sold, and a large percentage of them are found in this section of the city. Each push-cart is required to have and use a broom and a receptacle for refuse, but it is difficult to enforce this regulation. The peddlers not only do not clean up all of the vegetable and other refuse around their carts before leaving their position on the street, but they have formed the practice of dumping on the street all material left on their carts which is not worth saving. In addition to the peddlers, residents themselves add considerably to the littering, many of them throwing old clothing and bundles of rubbish from their windows, letting them fall to the streets where they will, and many of the sidewalks are never swept by the occupants of the adjoining property.

The majority of the push-carts are owned by what is known as push-cart stable men, each of which has many carts under his control which he rents to the peddlers for from 10 to 15 cents a day, and an effort has recently been made to enlist the interests of these men in preventing the littering of the streets by peddlers. On August 21, 45 of these push-cart owners attended a conference at the police inspector's office and were asked to assist the street cleaning department by telling all the peddlers to bring to the push-cart stables at night all refuse left on the carts, first picking up with their broom and receptacle all refuse lying on the streets around their carts. The police inspector told them that if the peddlers continued to disobey the laws, sooner or later the push-cart would be done away with altogether and they would lose the revenue which they now derive from renting them. They were also given about five hundred small books which had been printed by the New York Merchants Association in English, Italian and Hebrew at the request of John J. Kiernan, street cleaning superintendent of the Fourth district. The push-cart owners were told that if the rubbish on the carts was brought to their stables, the street cleaning department would have it all removed before midnight each day. This would not only prevent the littering of the streets, but the removal from the stables would be much easier than collection and removal from the streets. All of the push-cart owners promised to give all the assistance possible of the kind asked.

Before this, the street cleaning department had tried to obtain help from the boys of high school age living in the district, asking them to speak to the residents relative to sweeping sidewalks, throwing rubbish in the streets, etc. No result appeared to follow this appeal for co-operation of the boys. Two thousand of the books previously referred to were distributed by an employe of the department who speaks four languages and had been class instructor in the army. This man called on every store keeper and janitor and gave them one of these books, at the same time calling their attention to the dirty condition of the street and requesting their assistance of the street cleaning department in keeping the streets clean. In order to make the work more effective, a representative of the police department accompanied the street cleaning representative in a canvass of the entire district. As a result of this work, some improvement is being noticed in the general condition of the streets between Sixth and Eleventh streets, avenues A and D, which is the section where the littering has been worse and where most of these efforts have been concentrated.

## ANOTHER MEADOWS HIGHWAY.

The city of Newark, with its population of nearly 500,000 and its numerous industries, is separated from Jersey City and the ferries to New York by a considerable width of meadow land that extends from its southern to far above its northern limits and by Newark bay and the Passaic and Hackensack rivers. The only road crossing these meadows from Newark is the Lincoln highway. During the past four years the traffic over this highway has increased rapidly. Census figures show that approximately 10,000 vehicles are using the Lincoln highway during the twelve-hour daylight period, or a vehicle every four seconds. The Lincoln highway crosses the Passaic and Hackensack rivers on bridges which are only a few feet above the surface of the water and which have to be opened from time to time to permit the passing of water traffic. The records show that over 11 per cent of the year is lost to the road traffic by the opening of these bridges. Congestion on the Lincoln highway during rush hours has reached a very serious condition, as many as 300 vehicles at times being held up by the opening of the bridge. The average time necessary for such opening is approximately five minutes, and during the year 1918 the Passaic river bridge was opened over nine thousand times.

The above facts were presented by Frederick A. Reimer, county engineer of Essex county and P. J. Wasser, county engineer of Hudson county, at a meeting of the bridge committees of Essex and Hudson counties, and on their recommendation the two counties and the state highway commission each appropriated $5,000 to be used in making preliminary surveys, soundings and borings to determine the proper location for a new highway. A special committee to take charge of the work was formed consisting of F. P. Boland, Ernest Ryman, R. W. Booth, and a committee of engineers consisting of Mr. Reimer, Mr. Wasser, H. W. Hodge, consulting engineer: and Charles A Meade, of the state highway commission.

Before proceeding with the preliminary work, a public hearing was held at the Hudson county courthouse on June 10, at which many of the civic organizations of Essex and Hudson counties were represented. Following this hearing, the engineers prepared more specific plans as to the location of the proposed bridge, selecting a location immediately adjacent to and paralleling the Lehigh railroad bridge across Newark bay, about two miles south of Lincoln highway. One advantage of this location is that it affords facilities for truck deliveries to the industrial interests about Port Newark, a section of the meadows being developed by the city as an industrial center. Also, the highway would connect directly with projected street developments as planned by Newark, and by Bayonne and Jersey City on the other side of the bay. This location would tend to divert from the Lincoln highway trucks that had Port Newark and vicinity and points south of this as their destination. It was also thought that it would relieve congestion not only on Lincoln highway, but also at the "four corners," Newark's business center, through which the highway passes and which has for years presented Newark's most difficult traffic problem.

In as much as a large percentage of the traffic now using the Lincoln highway, and which would be diverted to the new highway and bridge, passes through Essex county to other sections of the state, a considerable share of the cost should, and it is believed will, be borne by the state at large. Should the bridge be constructed, it would probably become an important part of the state highway system. The cost of the bridge, with necessary approaches, is estimated to be about two and a half million dollars.

A further public hearing on this bridge was held on Tuesday, August 19, at Newark, and following this, the committee of engineers has decided to proceed at the earliest possible date with the preliminary surveys, soundings and borings.

## SCAMPED HIGHWAY BRIDGES.

A few months ago we gave prominent mention to the fact that a large percentage of the highway bridges in this country can not safely carry the loads which are permitted on the highways. It was assumed that most of these bridges are deficient in strength because designed for lighter loads before the recent advent of the heavy motor trucks.

There are, however, altogether too many instances in which the weakness of the bridge is due to poor designing or faulty construction.

A recent report on the bridges in Montgomery county, Indiana, brings to light a condition which it is to be hoped can be duplicated in few if any other sections of the country. This investigation was made by A. L. Donaldson, civil engineer and field examiner, T. L. Major and H. W. C. Fosdick, field examiners for the State Board of Accounts, reporting to Jesse E. Eschbach, chief examiner, on recent public works in Montgomery county. These examiners report that they find that "numerous bridges and culverts have been constructed in the last few years, which have broken and fallen within a short time after their completion and had to be reconstructed at the expense of the taxpays of Montgomery county; and from our own observations together with other information which we have obtained, we frankly state that we have not examined a single bridge or culvert that was constructed according to plans and specifications, and as a whole the work that we have examined is the most fraudulently constructed of any work of like character that has been brought to our attention." One case is cited in which a contract for a bridge was let on August 17, 1917, was paid for on October 4th of that year, and on May 7th of the following year a second contract was let for its reconstruction.

The investigators found that, instead of taking steps to secure proper construction, the different county surveyors have increased the amount of material used in walls and abutments by from 30 to 50 per cent above what is necessary. The report names a number of contractors as having defrauded the public by use of improper quality and insufficient quantity of materials, and recommends that the Board of County Commissioners instruct the county attorney to sue the contractors for sums, which the have calculated and state in each case.

Among some of the features of the work examined are the following: Concrete for substructure required to be one part portland cement to five parts of sand and gravel; concrete found contained at least ten parts of sand and gravel to one of cement. In this bridge the excavation for abutments and wing walls lacked 2.4 feet of being carried to the depth required by the plans. In the case of another culvert "owing to poor workmanship and the small proportion of cement used in the concrete and the fact that the excavation for the walls at the south end were made three feet less in depth than they were required to be made, these walls have broken to such an extent that it will be necessary to reconstruct them." A number of other bridges were found to be deficient in thickness and height, as compared with the plans upon which contracts were let. In another case a wing wall had been built which was not according to plans and the contractor was ordered to rebuild it, but was paid for the reconstruction as extra work, and the amount so paid for was 50 per cent greater than that actually put into the reconstruction.

It seems almost inconceivable that such faulty work would be permitted by the officials in charge of construction, but it is reported that the class of men employed by the commissioners to supervise construction of concrete structures "know less about that particular line of work than any other class of work they might be assigned to."

All of the structures referred to in this report were comparatively small ones, few of them costing over $2,000 each; but the collapse of a small culvert blocks a highway as effectively as that of a large one, while their number is so great that the simultaneous failure of any considerable percentage of them would practically remove all highways from use until they were reconstructed. The campaign for securing stronger bridges on our highways should unquestionably include culverts of all sizes; and also should include proper supervision of construction as well as proper designing.

## CONTRACTS AND FREIGHT RATES.

The following extracts from an article in the publication of the Associated General Contractors (which goes under the name of "Members' News Letter") brings up a matter of importance to all who are about to let contracts, especially those the performance of which will extend over a considerable period of time.

Recent demands of the railroad brotherhoods for increased wages amounting to approximately $800,000,000 have greatly strengthened the general belief that a marked advance in freight rates will be announced in the not distant future. However, until it is known how much of the wage increases will be allowed, no definite action can be taken as the additional income must at least balance the added expense due to higher wages.

In the meantime, it is evident that every contractor who is bidding on work should protect himself against the increased cost which would follow an advance in freight charges. This would be accomplished by estimating high enough to allow for the probable increase or preferably, in cases where the plan is practicable, by the insertion of a clause in the contract which provides for additional compensation to cover the increased cost due to higher freight rates.

Should the full demands of the railroad men be granted, the necessary increase in the freight tariffs would amount to at least 30 to 40 per cent, according to a writer in the New York Annalist. Such an increase would without question add greatly to the cost of most commodities, and as for its effect on contractors with uncompleted work, it would certainly change many a paying job into a losing one, and bankrupt other men who are now breaking even.

Particularly on state or municipal highways and street paving, where the freight charges are likely to form a high percentage of the total cost of the work, it is important that provision be made for relieving the contractor of the uncertainty resulting from the present railroad situation. In many cases it should be possible to secure the insertion of a paragraph in the contract and specifications which would protect the contractor against further advances. At the present time at least some of the states are giving the contractor the benefit of the special reducion of ten cents per ton on certain road building materials which was made last June on shipments to federal, state and municipal authorities.

One of these states is Illinois, which now includes in the specifications under "Special Provisions" a paragraph that covers future changes in freight rates as well as the reduction referred to. This policy has been announced by the Division of Highways, Department of Public Works and Buildings, as follows:

> All bidders are expected to base their proposals on the reduced freight rates above outlined and on the war tax exemption. All contracts entered into will contain a clause to the effect that in case freight rates are increased after the date of the receipt of bids and before the date set for completing the work, the contractor will be paid extra an amount equal to the increase in freight charges; and in case of a reduction in freight rates, a corresponding deduction will be made from the payments otherwise due the contractor.

## CALIFORNIA MUNICIPAL ELECTRIC PLANTS.

### Financial Results Last Year of Municipal Operation of Such Plants—Municipalities Taking Over Private Plants.

Municipalities throughout the state of California are giving serious consideration to the question of taking over their local electrical distributing systems, purchasing the current at wholesale rates and retailing it at a price to cover expenses and a fair margin of profit, which price is sufficiently low to encourage consumption and enlarge the number of consumers. A number of cities have already taken steps to take over the local systems by filing applications with the Railroad Commission to determine the just compensation to be paid therefor. The following cities and towns have such proceedings pending: Oroville, Merced, Chico, Mountain View, Mayfield and Sunnyvale. Other places are almost ready to take similar action. Los Angeles has recently authorized a bond issue of $13,000,000 to purchase the local system in that city.

In the case of one city—Redding—the Railroad Commission has fixed the value of the distributing system of the Northern Electric Company at $42,041, the claimed value of $225,000 being disallowed. This decision establishes certain principles to be observed in fixing values which will doubtless be adhered to more or less closely in the proceedings that are now pending.

Nineteen cities and towns in the state operate municipal lighting systems. The financial results of such operation are set forth in the annual report of the state controller in the "Financial Transactions of Municipalities and Counties for the year 1918."

The total ordinary receipts of these nineteen plants were $1,917,836; the total operating expenses were $903,806; the net operating revenue was $1,014,030. Out of this sum was paid $237,153 for interest and redemption of bonds and $443,275 for extensions and improvements, which last sum includes $71,316 receipts from the sale of bonds. The net profit was $404,946. The item of depreciation would appear to be amply provided for by the sums expended for the redemption of bonds and for improvements and betterments.

Considering the individual plants the following are the net operating revenues:

Los Angeles, $661,830; Pasadena, $102,092; Alameda, $64,499; Riverside, $92,602; Glendale, $17,776; Palo Alto, $16,286; Santa Clara, $3,158; Anaheim, $13,212; Colton, $5,494; Roseville, $4,585; Lodi, $14,677; Healdsburg, $6,896; Burbank, $7,342; Gridley, $6,015; Tehachapi, $1,430.

Deficiencies occurred as follows: Ukiah, $1,955; Azusa, $39; Loyalton, $698; Biggs, $1,171. In these cases, however, it is probable that no credit was given for the lighting of streets and that had such credit been given there would have been a profit instead of a loss. In the case of Biggs, the town has an extremely low rate which represents a gain to the consumers.

Most of the cities credit to their revenues the item of street lighting, and at a rate of about three cents per kilowatt, which is about twenty-five per cent lower than is usually paid to the privately owned systems.

There has been no increase in municipal rates due to the war conditions. Operating expenses have increased considerably since 1916, a part of which has been taken up by increased consumption.

Los Angeles, Alameda, Palo Alto and Loyalton generated practically all of their current and Healdsburg about two-thirds of the amount sold. The others purchase all or the greater portion from the hydro-electric companies. The following was the average price paid by the cities named per kilowatt:

Pasadena, $0.00566 (five and two-thirds mills); Riverside, $0.007; Santa Clara, $0.012; Anaheim, $0.009; Roseville, $0.01; Lodi, $0.009; Ukiah, $0.0135; Burbank, $0.0135; Gridley, $0.013; Biggs, $0.015; Tehachapi, $0.025. Complete statistics of other cities are lacking.

It will be observed that the larger cities purchase current for less than one cent per kilowatt, and the average for the smaller towns is about one and a quarter cents per kilowatt.

The municipalities retail the current generated and purchased at rates considerably in advance of the cost. The minimum rates charged in the different cities are as follows: Los Angeles, lighting $0.018, power, $0.0076; Pasadena, lighting $0.035; Alameda, lighting $0.0225, power $0.014; Riverside, lighting $0.04, power $0.0125; Glendale, lighting and power $0.0115; Palo Alto, lighting and power $0.02; Santa Clara, lighting $0.038, power $0.028; Anaheim, lighting $0.07, power $0.025; Colon, lighting $0.04, power $0.01; Roseville, lighting $0.03, power $0.02; Lodi, lighting and power $0.02; Healdsburg, lighting $0.08, power $0.03; Ukiah, lighting $0.03, power $0.015; Burbank, lighting $0.0585, power $0.0395; Azusa, lighting $0.0515, power $0.033; Gridley, lighting $0.024, power $0.02; Loyalton, lighting $0.10, power $0.035; Biggs, lighting and power $0.03; Tehachapi, lighting $0.04, power $0.03.

Most cities impose a minimum or service charge and this operates to provide compensation for line losses. This line loss is usually about fifteen per cent of the current. In other words, the total current registered by consumers' meters is about fifteen per cent less than the amount registered at the station meter.

The Railroad Commission has as yet fixed no valuation for distributing systems, except in the case of Redding. Hearings have been held in the other cases, arguments made and briefs filed, and decisions will probably be made soon. If the price fixed is the fair compensation to be paid for the systems to be acquired it remains to be seen whether or not the utility companies will accept the same in the spirit of fairness; whether they will impose obstructions and require condemnation proceedings followed by appeals to the highest courts. It is a situation full of interest and possible developments. In the event that such obstructions and delays are encountered, the municipalities will no doubt consider the exercise of their constitutional power and go ahead and construct their own systems. This, however, will probably not be done except as a measure of last resort.

The above information is from an article in "Pacific Municipalities," prepared by H. A. Mason, one of the editors of this, the official organ of the League of California Municipalities.

## DISPOSAL OF COMMERCIAL WASTES.

The Merchant's Association of New York City has employed Prof. O. H. Landreth to study the problem of disposal of municipal wastes, especially the factory and business wastes (including garbage) now disposed of at private expense. This disposal at present places a heavy burden of expense upon business interests, and the association hopes that Prof. Landreth may suggest some plan whereby this expense may be lessened, and at the same time more sanitary disposal be obtained.

# AMERICAN VIEWS FOR FRENCH HIGHWAYS.

### Expressed by Committee of American Engineering Societies in Response to Conclusions Submitted by French Engineers for Its Consideration.

In December, 1918, and January, 1919, a delegation of American engineers visited France, at the invitation of the Congrés General du Génie Civil, to discuss with the French engineers the large engineering problems facing that country. The delegation consisted of six representatives from the Am. Soc. of Civil Engineers, and one each from the Am. Soc. of Mechanical Engineers, Am. Inst. of Electrical Engineers, and Am. Inst. of Mining Engineers. Six committees were formed, on Commercial Ports, Water Power, Navigable Waterways, Roads, Technical Education, and Agricultural Development. The report of the delegation to the several societies contains much matter of interest to American engineers.

The committee on Roads, consisting of Geo. W. Tillson, and Nelson P. Lewis, reported that a French committee on roads had submitted to it for consideration conclusions that may be briefly stated as follows:

Broken stone roads have ceased to be satisfactory for modern traffic, and must be abandoned for all roads carrying any large amount of travel.

Surface applications of bituminous materials have generally proved insufficient and only palliatives against dust.

Penetration bituminous macadam is very satisfactory, involving no great expense for plant.

Bituminous concrete (pre-mixed) necessitates a more or less expensive plant and increases the cost. "Experience extending over 10 years has demonstrated in the United States the ability of such surface to withstand heavy travel for 10 years or more, if carefully constructed, the latter point being essential."

The highest type of asphalt surface is that known as sheet asphalt. This type is the most desirable for main arteries if its construction can be financed and if it be properly maintained.

Asphalt surfaces have proved successful in all climates from Canada to Cuba, and from cold and rainy New England to southern California.

Cement concrete pavements are of particular value in the neighborhood of cement plants. They possess the advantage that they can be used as foundations for other types of roadway after their original utility has gone.

Vitrified bricks of the best character are serviceable, but only near brick plants. They are much more expensive than the types previously mentioned and can hardly be considered in the road problem of France.

As a result of these considerations, the old system of French road surfacing must be entirely given up; but neither local nor central government can finance the reconstruction now. Therefore "the repairing of the road system can only be done through the medium of private enterprise which would find the capital, enter into agreement with the Communes, the Departments, and the State, and undertake the construction of some well determined portion of road, guaranteeing the maintenance of the same during a certain number of years, an annuity including the former yearly price of maintenance, increased by the present greater value, and even of an excess if justified by the improvement being provided for. It will be then advisable to ask the American engineers how the road budget problem has been solved in America, and to examine in what proportion we could apply in France the American solution."

In reply to this the American committee said:

Referring specifically to the tentative conclusions of the French members of the Committee, submitted at the first meeting held on December 20th, 1918, the American delegates would say as regards methods of construction:

1st.—That they heartily agree with the proposition that broken-stone roads have been found to be unsatisfactory for motor vehicles of heavy weight and great speed, and that, consequently, this method of construction should be given up for road surfaces carrying a large amount of traffic. This conclusion has been reached in America, and what is known as water-bound macadam is sometimes used, but only where a temporary roadway is required.

In arriving at this conclusion, the American delegates wish it to be clearly understood that they recognize fully the value of these water-bound macadam roads during the recent war; that, while they did suffer materially under a heavy traffic, their character was such that repairs could be quickly made, and the roads kept in almost continuous use. This, of course, was expensive, but, in times of war, quick results are necessary, rather than economy, and construction methods are perfectly proper and justifiable that would be very extravagant in times of peace.

2d.—That they fully agree with the conclusion that surface applications of bitumen to broken stone surfaces have not been satisfactory for heavy traffic, but that a more satisfactory surface known as "asphalt macadam" can be constructed by what is known as a "penetration" system, and that it can be laid in the way referred to so that good results can be obtained. In the construction of bituminous concrete pavements, a much more elaborate plant is required, which naturally makes the cost of the road surface more expensive. It is probable, however, that the extra cost is justifiable on account of the greater durability of this class of pavement.

In the memorandum it is stated that experience has demonstrated that this kind of pavement will stand heavy traffic for ten years or more, if carefully constructed. The American delegates think this is a rather optimistic view. It depends, however, on just what is considered "heavy traffic." The word "heavy," as applied to traffic, is a very indefinite one, for with the increased weight of trucks that have been in use during the last two or three years, what would have been considered heavy traffic five years ago would be medium traffic at the present time.

3d.—The statement that the highest type of asphalt surface is that constructed with a mineral aggregate of sand of very fine nature, to which a proper quantity of dust and asphalt is added, is undoubtedly correct for a city pavement. It is, however, exceedingly doubtful if such a pavement would withstand the heavy units of motor traffic that are in use at the present time and likely to increase in the future.

4th.—That, as to the use of brick for road construction in France, they feel some hesitancy in making any recommendations, as they are unfamiliar with the character of shales and clays in France.

The American delegates were asked for an expression of opinion as to the methods of financing road improvements in France, and the possibility of inducing private companies or contractors to undertake such work, receiving their compensation in a number of annual installments, fifteen such payments having been suggested.

It is probable that there are American companies or contractors who would be ready to finance road improvements with their own funds and accept payment in a number of annual installments—provided they are given entirely satisfactory guarantees of payment. It must be pointed out, however, that they would be obliged to borrow the money, thus paying a higher rate of interest than the State, and that they would expect a larger profit and a good rate of interest on all their carrying charges—so that the amount of work done for the same total expenditure would be much less than if they received prompt payment in full and release from their obligations. The credit of the State would be better than that of the private companies, and it would seem that it should be availed of, in order to secure satisfactory results with a minimum of expenditure and in the shortest possible time.

Special attention was called to the folly of providing funds for road improvement by the issue of long-term bonds, running for a period far longer than the life of the road surface, specific instances being given to show how costly such policies had proven. The plan of imposing assessments for the benefit of such improvements, so frequently followed in America, more particularly in cities, and the apportionment of the cost of the work between State, county and town, were described in considerable detail.

Our Committee also presented the following memorandum relative to American practice:

During the last few years in the United States the material used in road construction has been principally bitumen in its various forms, cement, concrete, and brick. The different methods in which bitumen has been used are known as the bituminous concrete pavements and bituminous macadam pavements.

A bituminous concrete pavement is one composed of broken stone, broken slag, gravel, or shells, with or without sand, Portland cement, fine inert material, or combinations thereof, and a bituminous cement incorporated together by a mixing method.

A bituminous macadam pavement is one having a wearing course of macadam with the interstices filled by a penetration method with a bituminous binder.

Bituminous concrete pavements are sometimes divided into three classes:

Class A.—A bituminous concrete pavement having a mineral aggregate composed of one product of a crushing or screening plant.

Class B.—A bituminous concrete pavement having a mineral aggregate composed of a certain number of parts by weight or volume of one product of a crushing or screening plant, and a certain number of parts by weight or volume of sand, broken stone screenings, or similar material, with or without a filler.

Class C.—A bituminous concrete pavement having a predetermined mechanically graded aggregate composed of broken stone, broken slag, gravel, or shell, with or without sand, Portland cement, fine inert material, or combinations thereof.

Sometimes, when a water-bound macadam pavement has been laid for some time and requires improvement, a thin coat of bituminous material is spread over the surface. While this cannot be considered a permanent construction, it has been used to quite an extent on light traffic roads with good results. It is especially good as a preventive of dust.

Which of the above kinds of pavement are to be used in any particular case must be decided by conditions, the principal ones being traffic, first cost, cost of maintenance, life of the pavement, and the availability of the material.

In considering the traffic, there must be taken into account, not only the volume of traffic, but also the units of traffic. It will be easily understood that 10,000 tons of traffic in units of 10 tons will injure a pavement more than the same amount of traffic in units of 1 ton. In the former case, the pavement must be given a solidity that will sustain the heavy units.

In considering the matter of cost, it must be remembered that first cost is not the only item that makes up the ultimate cost of the pavement, but that the cost of repairs must be carefully considered. Very often, a pavement, the first cost of which is great, will be less expensive in the long run on account of the lesser cost of maintenance. It is easily understood, of course, that the longer the pavement will last the cheaper it will be as a general proposition. It must also be remembered that certain materials, like bitumen, have a certain durability irrespective of traffic, while others, like stone, for instance, are worn out or destroyed only by traffic.

The availability of material is always an important consideration. It would be useless to think of a material for road work, which is at so great a distance from the point of use that the freight charges would make it too expensive. Often a poorer material should be used when, theoretically, a more expensive and more durable one would be advisable.

Although it was stated at one of the meetings of the Committee that conditions were such in France that brick and cement concrete could not be used to advantage, it was thought best by the American Committee to furnish information regarding these roads to the French Committee.

The Committee, too, would suggest a further trial of cement concrete for road work. It must be remembered that when any new type of road is first used, errors are apt to occur in construction, which give bad results, and, at first glance, it would seem to reflect on the material used, when, as a matter of fact, the trouble is in the method of construction. The character of cement concrete roads in America has been improved very much during the past five years, as a result of which large quantities are being laid in practically all the states doing road work. With the natural tendency of the French engineers to work carefully and to achieve good results, it is thought that possibly if another trial is given, taking into consideration American practice, results may be achieved that will be more satisfactory than in the past.

Brick roads have been used in the United States to a great extent, and very satisfactorily. In many portions of the country, stone or other paving materials are extremely scarce, and where a clay, or a clay mixed with shale, can be obtained that will produce a good paving brick, such pavements can be laid with satisfactory results. If, in France, clays or shale can be obtained that will produce brick that will stand the specifications provided for American brick, there ought to be but little fear in their use. It must be understood distinctly, however, that the brick must be good, in order to produce good pavements.

At a meeting held on January 3d, our Committee submitted numerous documents descriptive of the practice of road construction in the United States, and the manner in which road improvement is financed. These consisted of forms of contracts and specifications of the New York State Highway Department, covering the construction of all kinds of roads built in that State, a copy of the "Final Report of the Special Committee of the American Society of Civil Engineers on Materials for Road Construction and Standards for Their Test and Use," and proof sheets of several sections of the "American Highway Engineers' Handbook," then in press, containing exhaustive descriptions and discussions of materials and methods, as well as the manner in which such improvements are financed in rural and urban districts.

After an exchange of views the following conclusions were unanimously adopted and presented to the Congress:

1. Broken stone roads, which formerly were deemed suitable even for city streets, are soon damaged by motor vehicle traffic, to which they are not adapted. The tarring, which has mitigated the nuisance from dust, only very insufficiently preserves the road surface from the wear and tear due to the travel of vehicles with mechanical traction.

2. New systems of construction have been developed, the most successful, perhaps, being cement concrete and bituminous and brick surfaces. Experience extending over a sufficient number of years has shown that the preference to be given to one or the other of these various systems of construction depends on several factors: climate, intensity of travel, cost price, etc. The brick surfaces used in America could only be used in exceptional cases in France. Cement concrete roads are only advisable in countries where the materials used in their composition are at hand at advantageous prices.

3. Roads constructed with bitumen or asphalt aggregates are, unfortunately, very expensive, but they have the advantage of requiring less maintenance than broken stone roads. For an equal travel intensity, they answer much better the exigencies of the travel of motor vehicles.

4. The cost of laying these roads is considerably lowered when this system of construction is applied to broken stone roads, the old broken stone constituting a good foundation.

5. The reconstruction of the French road system is necessary on account of its great deterioration due to the travel during the war. It would be folly to restore this system as it was before, as it could not withstand the traffic of motor vehicles, which will grow rapidly to meet industrial and commercial requirements, as well as those of tourists, and the expense of maintenance of broken stone roads would greatly increase without giving satisfaction to those who use them. Happily most of the French roads will make excellent foundations to which it will be sufficient to apply appropriate wearing surfaces. Under these conditions, it will be possible to adapt the roads to the new requirements without incurring very great expense.

It would be logical that the expenses relative to the improvement and maintenance of the roads should be borne by those who use them, and the abutters who profit by the travel. This principle, admitted and applied in some foreign countries, permits the issue of bonds for the improvement of roads, the capital being guaranteed by taxes and revenues which are certain and which increase with the intensity of the travel, as, for instance, taxes on motor cars, on gasoline, etc. Unhappily, the fiscal laws in force in France do not allow this procedure, and, as it is not possible to count on voluntary contributions, it is necessary to have recourse to the budget of the State, "Departments," and "Communes," in order to obtain the necessary allowances to bring the road system to a state capable of meeting the new requirements.

If, however, the State, "Departments," and "Communes" could not find the necessary capital, private enterprises might be organized to undertake the construction of some well defined portions of roads, guaranteeing their maintenance during a certain number of years, with the proviso that an annuity including the old yearly price of maintenance increased to cover the new conditions, and a further sum representing the value of a prompt realization of the benefit of the improvement, should be provided, in addition to the cost of construction.

Though this proceeding may be more expensive than direct construction through the Public Works, it will be necessary, perhaps, to have recourse to it, on account of the circumstances created by the war.

The study of the financial question must be pursued in subsequent discussions, with the co-operation of persons qualified to give useful advice.

## HIGHWAY ENGINEERS AND EDUCATING THEM.

In an effort to find out to what extent the engineering schools of the country are equipped to meet the demand for highway engineers that is coming as a result of Federal and State road-building programs, the Commissioner of Education has sent a letter of inquiry to the presidents of universities and deans of colleges and schools of engineering. In his letter Dr. Claxton says:

"The United States and almost all the States are undertaking an extensive program in road building involving the expenditures of many hundreds of millions of dollars. The Federal Government has made large appropriations. States and counties are voting bonds in large quantities. The movement is comparable to that for railroad construction three or four decades ago. For the next 10 or 20 years there will be a demand for a large number of highway engineers of the best type, and unless they are supplied in sufficient quantity much of the money appropriated for roads will be wasted.

"Upon investigation the Bureau of Education finds that comparatively few higher institutions in this country offer definite curricula leading to a degree in highway engineering, although subjects relating to highway engineering are generally taught to some extent in connection with the usual civil engineering courses.

"Information in regard to courses offered in highway engineering and the number of students taking them will be of great value to the country at this time."

# The WEEK'S NEWS

**New Hampshire's Auto Headlight Law—New Jersey to Take Over Work of Slow Contractors—Townsend Bill Does Not Affect Federal Aid Work—Decisions of State Utilities Commissions—Lower Lighting Rates in Pittsburgh —Progress in Standardizing Fire-Hose Threads—A Profitable Municipal Savings Bank in St. Paul.**

## ROADS AND PAVEMENTS

### New Hampshire's Auto Headlight Law.

Concord, N. H.—New Hampshire's law regarding the dimming of auto headlights on highways has given problems to some of the officials charged with its enforcement. The law provides that

> The light from the front lamps shall be sufficient to be visible at least 200 feet in the direction in which the motor vehicle is proceeding, and all motor vehicles equipped with electric headlights shall also be equipped with some device to dim the glare or to scatter the rays of light from the same, which shall have been approved by the commissioner of motor vehicles, and it shall be the duty of any person having control, or charge, of a motor vehicle which is equipped with electric headlights to dim or extinguish such headlights when approaching an electric street railway car or another automobile.

Commisisoner of motor vehicles, Olin H. Chase, has spent much time in consideration of a satisfactory rule for dimming lights, and while he says that he is aware that no regulation which he has been able to devise will settle the problem of glaring headlights, he has devised a rule which he believes is the best that can be framed under the circumstances. This is:

> No person shall use on a motor vehicle operated on the public highways of the state of New Hampshire any lighting device of over four candle power equipped with a reflector unless the same be so designed, deflected or arranged that no portion of the beam of reflected light, when measured seventy-five feet or more ahead of the lamps, shall rise above forty-two inches from the level surface on which the vehicle stands under all conditions of load.
>
> Spotlights shall not be used except when projecting their rays directly on the ground and at a distance not exceeding thirty feet in front of the vehicle.

In an official circular promulgating this rule the commissioner says:

> The methods of regulation which have been experimented with in other states may be divided into two general classes:
>
> First—Giving each dimming or diffusing device submitted an official test and approving or disapproving it upon that test.
>
> Second—Fixing a limit of the distance from the ground to which the light cone may be permitted to rise.
>
> The most conspicuous fact in connection with both of these methods is that neither is satisfactory. There are about sixty different dimming and diffusing devices on the market, and in passing upon most of them it is necessary to take into consideration the candlepower and focus of the lamps used in order to obtain satisfactory results. Study and experiment have led the highest authorities to adopt forty-two inches as a safe height to which reflected light may rise seventy-five feet ahead of the car.
>
> The commissioner has chosen the second method, not because it affords a complete solution of the problem, but because it promises more of remedy and less of difficulty than the first method.

### Plans for Making English Highways Safe.

London, England.—In a report on desirable reform for improving public highways, the road committee of the Institution of Municipal and County Engineers, declare that for the purpose of dealing with dangerous corners, special powers should be conferred upon highway authorities as follows: "To prevent the formation of dangerous corners: (a) Power to require an additional setback of all new buildings at junctions or intersections of roads or streets beyond the general line of frontage to such extent as the authority may deem necessary for the purpose of providing a view of approaching traffic: (b) power to prescribe the height and character of the fencing enclosing land at junctions or intersections of roads or streets or of any erections thereon. For the purpose of improving existing dangerous corners: (c) Power to acquire any necessary land; (d) power to require the removal, pulling down or setting back of any buildings, erections, trees, hedges or fences, or lowering any banks which obstruct the view of approaching traffic; (e) the power to require the owners or occupiers of land at the junctions or intersections of streets or roads to keep down all line fences and trees to a prescribed height, and prescribe the character of fences to be erected or maintained thereupon. Failing agreement between any road authorities concerned in the application of the foregoing powers, the local government shall act as arbitrators. With regard to trees and hedges upon and adjoining highways, the committee is of the opinion that Section 65 of the Highway Act of 1835 should be amended in the direction of giving power to the highway authority to require the pruning or removal of trees, hedges or other obstructions to the full and safe use of the highway. The committee is of opinion that the law of extraordinary traffic needs simplifying and amending, particularly in the method of recovering damages."

### State Will Take Over Jobs of Slow Contractors.

Trenton, N. J.—Where contractors having work in the construction of the new state highway lag behind in the completion of their contracts, the state highway commission has decided to take over the work from such firms. This decision was reached as the result of the slow progress on the Atce-Ancora, Camden County, section of Route 3, of the new highway system. One more inspection was ordered to be made by highway engineer William C. Thompson, and should he find the progress to be as halting as it has been, then the commission will order the continuation of the contract stopped. Another newly announced policy is the decision to require every contractor submitting an estimate for state highway work to accompany his bid with a certified check for ten per cent of his estimate, as well as a bond from some reliable surety company as proof of his intention and ability to complete the work. In cases where the work is to be done by a county, the contractor may have the alternative of posting as low as $1,000 or putting up personal security. The commission has announced that it is to receive from the federal government for road building purposes 212 army trucks. The commission will probably ask for a law next winter which will permit it to give some of the machines to the county road departments for their use.

### Townsend Bill Sponsor Finds No Conflict with State-Aid Law.

Washington, D. C.—According to the opinion of Senator Townsend, author of the Townsend national highway bill, the legislation will have no effect on federal state-aid work. In a letter sent to S. M. Williams, chairman of the Federal Highway Council, he says: "Replying to your inquiry concerning my views as to the effect of the passage of the so-called Townsend national highway bill upon the present or future of the federal state-aid law, now in existence, I hasten to say that such effect cannot be by any possibility detrimental to the state. The object of the bill introduced by me is to establish and maintain a national system of highways, according to a national plan, connecting the different states of the Union, and affording an example of proper highway construction, which will be beneficial to the states. The bill does not in any manner injuriously affect existing law; in fact, it provides that the commission created under it shall have charge of the federal-aid law, and shall make reports annually to the Congress as to what is being accomplished under existing law, and make such recommendations for the future as the operation of the law and its results seem to make necessary. The two systems of road building are separate and distinct, except that they are under control of the same federal commission. The appropriations, however, cannot be mingled, and the results will be known and properly appraised by the people from time to time. If the present federal-aid law proves satisfactory, it will, as a matter of course, be continued, and probably enlarged; if the proven results are not satisfactory, that law will be discontinued. And what I say of the federal-aid law will be true of the bill now pending before the senate. The commission appointed under the law, it may be safely presumed, will be high-grade men, representing different sections of the country, and their lifework will be to serve the people by furnishing the best possible highway transportation facilities."

## STREET LIGHTING AND POWER

### Commission Allows Higher Rates.

Boyerstown, Pa.—A decision of the Pennsylvania Public Service Commission, dismissing a complaint against proposed increases in rates of the Boyerstown Electric Company, states: "The former rates were apparently satisfactory, and predicated upon that fact the net income derived under them could not be maintained to have been unreasonable or excessive. The companies' figures for 1918 show a net return for that year considerably lower than in 1915 and in 1917. It therefore would appear to be reasonable to presume, in the absence of definite and conclusive evidence to the contrary, that the respondents should not be restrained, under existing operating conditions, from applying rates that are earning a lower net revenue than the companies obtained under the old tariff. From the position taken by respondent in defending its action it would appear that the tariff under attack was filed to provide an emergency rate to continue in effect at least during the period of the high prices recently prevailing. Counsel for respondent so maintained in his brief. This in substance is implying that when the cost of labor and materials resumes a normal and stabilized level there will be a revision of rates filed under a new tariff. The commission accordingly finds under circumstances now controlling that the complaint should be dismissed, with the privilege accorded to complainants to file a new complaint, if they so desire, should the present rate be continued when expenses for operation and plant maintenance have fallen sufficiently to indicate that the net earnings of the respondent may show a material increase per annum."

### Valuation of Unused Water-Power Site.

Charleston, W. Va.—A recent decision of the state public service commission takes up the question of valuation of unused water-power sites and of a steam plant constructed by the Appalachian Power Company. The commission handed down a decision in part as follows: "It appearing that a reasonable forecast of the development of the business of applicant justified the acquisition of said unused sites at the time the same were purchased, we are of opinion that the value of said unused sites should be carried as a deferred capital charge, and, when put into use, charged to capital investment at the original purchase price plus the accumulated interest upon said investment, and that the applicant's consumers using the energy generated from said sites should be required to pay a reasonable return thereon rather than ratepayers of the present period. . . . We are unwilling to undertake to substitute our judgment for the business sagacity and foresight of the managers of the applicant company which dictated the construction of this steam plant at this time. It does appear from the evidence that the applicant has been able to supply the demands of all of its present consumers from its plant capacity now installed; that the demand during the past year amounted in round numbers to 95,000,000 kw.-hr. However, a reasonably prudent regard for power requirements incident to the rapid development of the region in which the applicant operates would, in sound business judgment, require that the capacity of the applicant be kept somewhat in advance of the immediate demands of its consumers. The applicant as a public service utility is required to be ready to supply adequate service and facilities upon reasonable terms and conditions to all who apply therefor within the territory served by it, and its failure to maintain a capacity slightly in advance of its immediate requirements would render it incapable of performing its public duty in this respect. We are unable to say from the evidence that the applicant, when this plant is completed, will have a greater capacity than a proper regard for the demands of its present and prospective consumers will require, but inasmuch as the applicant is entitled to charge as a part of its capital investment interest upon its incomplete construction, we are of opinion that the investment in such incomplete construction should not be made a part of the rate base as to present consumers until actually put into operation."

### Commission Opposes Valuation at War Prices.

Springfield, Ill.—A joint petition of the Southern Illinios Light & Power Company and the Centralia Gas & Electric Company for authority to purchase and sell electric and gas property of the Centralia company has been dismissed by the Illinois Public Utilities Commission. On the question of war-time prices, the decision says: "The commission cannot subscribe to a valuation which is based upon war-time prices in a case where substantially no investment has been made under war-time conditions. To do so would result in burdening a public already carrying a heavy load of war-time prices with increased costs of service received from plant and equipment which has experienced no added usefulness because of the war-time situation. Such a burden so placed could benefit only the interests selling the property, to the permanent disadvantage of the public which receives the service and the utility which would assume the responsibility of operating it upon a financially sound basis. We do not wish to be understood as condemning investment wisely and prudently made in the necessary development of utility property during war times. In many cases extensions and betterments have been made in the interests of the public good under these unusual and trying conditions. Capital so invested is entitled to consideration, but such does not appear to be the case to any marked extent in the present case."

### Lower Rates for Street Lighting Contract.

Pittsburgh, Pa.—Special city counsel C. K. Robinson has reported on the agreement reached between the city and the Duquesne Light Company, whereby the city consented to withdraw its suit against the company. The suit was instituted to compel the company to reduce the rates. The chief points of the agreement are: Arc lamp prices per annum reduced $7.50 for overhead circuits and $10.50 for underground circuits. Annual saving to city at same coal price more than $40,000. New specifications providing for replacement of obsolete lamps and increased use of incandescent lamps in accordance with prevailing tendency. Residence rates reduced approximately 50 per cent and now as favorable with any other comparable city. Commercial light and power rates reduced approximately 7 per cent. Saving to consumers estimated by company as $600,000. In the negotiations leading to the recent rate reduction the company promised to set aside an adequate depreciation allowance, replace or discard obsolete equipment, maintain the properties properly, build a large efficient generating station at Cheswick; make further rate reductions commensurate with the economies effected; furnish city officials freely with information concerning the company's statement that it is now keeping their accounts in complete accord with public service commission's standard accounts will provide valuable and hitherto unavailable knowledge for future negotiations with the company. An understanding was reached with the president of the company that property purchased from surplus earnings would not be included in the total capital upon which the company should receive a return valuation of plant equipment. An examination of a large part of the company's equipment has been made and considerable information collected of its age and condition. From this has been calculated the approximate cost of this part of the company's property, which information has been made available for further use. The company is to do the following things:

Replace several hundred obsolete arcs now in use with modern arcs as provided in street lighting contract.

Expend larger sums for maintenance to make up for deficiencies during war period due to lack of labor.

Improve Brunots Island power station by replacing any obsolete inadequate equipment with modern equipment. Increase present capacity of boilers, feed water heaters and superheaters, and secure further operating economies in ash handling arrangements.

Complete new power station at Cheswick as promptly as possible and thereupon shut down the present smaller and less efficient generation stations and dispose of the portions not needed for sub-stations.

The following things are to be done by the city: Provision should be made for an organization which could deal with all phases of public utility supervision and regulation. This is especially important in view of the promises made by the company respecting its future policy in the matter of maintenance, replacement of obsolete equipment, new construction and in the matter of financial policy. Maj. Clayton W. Pike was the consulting electrical engineer in the city's negotiations.

### English City Gas Plant Makes Profit Despite War.

Nottingham, England.—The annual report of Nottingham's municipal gas plant for the year ended March 31, 1919, shows that the total income of the undertaking amounted to $2,280,383 and the expenditure to $1,817,932, leaving a balance of $463,451. To this sum has to be added $148,175 brought forward from last year and bankers' interest amounting to $38,236, a total of $648,862. After deducting the interest on capital and contributions to sinking funds and allowing $17,500 for depreciation of stores there is a balance of $341,763 at the disposal of the municipality; this will be applied toward the reduction of the city taxes. There were 132,008 tons of coal and 77,009 gallons of oil utilized to manufacture 1,739,386,000 cubic feet of coal gas and 73,284,000 cubic feet of water gas, 60,357 tons of coke, 7,401 tons of tar, and 18,959 tons of ammoniacal liquor. In addition 394,862,000 cubic feet of gas were purchased from the government, which had taken over one of the local gas plants for munition purposes. The total quantity of gas available for consumers was thus 2,207,532,000 cubic feet. The quantity sold was 2,059,370,900 cubic feet, a decrease of 185,299,400 cubic feet, compared with the preceeding year, and a decrease of 191,931,800 cubic feet, compared with the last pre-war year. Gas sold for public lighting was 13,083,800 cubic feet, contrasted with 102,143,500 cubic feel for the year ended March 31, 1914. The gas unaccounted for during the year was 148,161,100 cubic feet, of 6.71 per cent, compared with 65,857,700 cubic feet, or 2.85 per cent the previous year. The total length of mains laid at March 31 last was 408.05 miles. There were 143 new gas services connected to the mains, as against 306 the previous year. The meters installed to March 31 numbered 84,215, an increase of 401. The number of public lamps erected at March 31 was 8,182. In use are 35,447 gas cooking stoves, 20,243 gas fires, and 807 gas engines. It may be noted, in connection with the above report, that the coal used at present in the manufacture of gas costs $5.60 per ton, as against $1.96 in 1914, fire brick $44.40 per 1,000, compared with $15, and timber (deals) $265.20 per standard as against the immediate pre-war price of $70.53.

### Jurisdiction of Commission Over Inter-Utility Service.

East St. Louis, Ill.—The Illinois Public Utilities Commission has decided that the intent of the law is to give it complete jurisdiction over every product or commodity sold by a public utility for any purpose whatsoever so long as this product and commodity partakes of the nature of a public utility service or directly or indirectly exerts an influence upon such a service. This point was raised in a case in which service was furnished by one company to another. The contention is made that the furnishing of service by the East St. Louis Light & Power Company to the St. Clair County Gas & Electric Company is not a public utility function. The commission declares it cannot subscribe to this theory. While theoretically the St. Clair County Gas & Electric Company may be free to contract for service of this character with any other public utility in the state, as a matter of actual concrete fact this latitude of choice does not exist for the reason that other public utilities may not operate within a reasonable distance and may not render service of a suitable character practically applicable to meet the requirements of the situation. The contention is also made that the public is in no way interested in such contracts. It would appear, however, that the interest of the public is a very direct and vital one. It would be entirely possible and in some cases the circumstances have arisen that the contracts entered into between two public utilities have been entirely unjust and unreasonable and have placed an undue burden upon the one or the other. This burden, if of sufficient extent, as it may be, might operate to place the public utility in such financial difficulties that the rendering of adequate service to the remainder of the public would be impossible. Certainly it is the intent of the law that under such circumstances the commission should have the right to intervene and adjust the contract upon an equitable basis so that as a net result the public will receive service of an adequate and sufficient character, while the public utility shall continue to live and operate with reasonable profit. It is the intent of the Public Utilities Commission law to give the commission jurisdiction over a public utility sufficient to protect the public in all features of the service rendered and the rates charged. Should it develop as a result of a contract of this character that the inter-utility service furnished is inadequate, subject to interruptions, or in any other way unsuitable for meeting the public convenience and necessity, it is the apparent intent of the law that the commission shall have the full right to determine the facts and order such modifications of the contract or the methods of operation of the properties as will result in the securing of service for the public which shall meet its necessity and convenience.

### Municipalization of Part of Electric System.

Hooverville, Pa.—A recent decision of the Pennsylvania Public Service Commission, affecting property of the United Light, Heat & Power Company here, holds that a borough may condemn and acquire the transmission system, transformers, poles, wires, etc., of a public service company for the purpose of lighting its streets and for supplying electrical energy to the public without taking over that part of the system which lies beyond the borough limits. It appearing to the commission that in the present instance the acquisition of the electrical system was necessary and proper for the service, accommodation, convenience and safety of the public, the commission approved of the same and ordered that a certificate of public convenience be issued.

## MISCELLANEOUS

### Standardizing Fire Hose Threads.

New York, N. Y.—According to a statement by the Committee on the Standardization of Fire Hose Threads of the National Board of Fire Underwriters, "in every conflagration there have been cases where aid from adjoining cities has been valueless because the hose threads of the two cities were different and the apparatus could not connect to the hydrants. In the Baltimore conflagration, for example, when engines arrived from other cities to assist in extinguishing the fire, it was found that many of them could not connect with the Baltimore hydrants, and, consequently, were useless. More recently, a conflagration at Mobile, Ala., made rapid headway partly because of the time lost in trying to connect up hose brought from nearby shipyards, which did not have the same thread as the city hydrants. Many makeshift schemes have been adopted, such as providing adapters by which the visiting apparatus could be connected to the hydrant. In the stress of fire these have often been misplaced or have been insufficient in number, or in other ways have proven unsatisfactory, and it has been recognized for many years that the only solution was to change existing couplings to the National Standard and thus have cities equipped with hose threads of the same dimensions. Results recently accomplished by engineer J. H. Howland, of the Committee on Fire Prevention and Engineering Standards, conclusively indicate that the field work of standardizing fire hose threads is not only practicable, but in the very near future is destined to assume country-wide proportions. Ten days' field work in May last resulted in converting to the National Standard the existing threads on all hose couplings, hydrant nipples and caps, play pipes, special connections to fire equipment in the municipalities and protected manufacturing plants of High Bridge and Lambertville, N. J., and New Hope, Pa. In all, 191 pairs of hose couplings, 84 special fittings and 219 hydrant outlets were made standard. Including hydrant caps and combination fittings there were close to 850 threaded parts rechased and made to conform exactly with the National Standard thread. With an average of three men handling the standardization tools this work was accomplished in approximately seven days' actual working time. This field work was the first real test of the practical application of specially prepared tools, consisting of taps, dies, expanders, vises and accessories. While the actual work of standardization was completely accomplished, difficulties met with indicated that there was an opportunity so to perfect the tools as to save a lot of time and laborious work. The tools in many respects have since been redesigned and added to, so that they are now believed to be about as nearly "fool-proof" as possible. Trial tests in the shops at least show that the perfected tools do the work in much less time and with greater ease. Arrangements are now being made in co-operation with state fire marshal H. H. Friedley to standardize completely the fittings in several of the protected cities and towns in Indiana, with a view to starting a well-organized movement to standardize the entire state. From even more encouraging results, which there is every reason to believe will shortly be obtained in Indiana, it is expected that similar movements will then be initiated in many sections of the country, in which case it may be truthfully said that the long hoped for standardization of fire hose threads has 'gone over the top' with flying colors."

### Municipal Bank Saves Money for City.

St. Paul, Minn.—The "municipal savings bank" of this city had deposits totalling $3,635,000 on July 1, 1919, after six years of operation. The "bank" is operated by one clerk. It accepts deposits and issues 4 per cent certificates redeemable on demand and with interest, whether the money has been on deposit a day or a year. For the investment of its deposits the "bank" buys tax certificates and bonds of the city, particularly at times when the city would have to pay high rates for loans through commercial channels. Within the past 12 months the "city bank" has taken $100,000 of 4½ per cent, 30-year water bonds, $600,000 of 4½ per cent school bonds and $750,000 of 5 per cent tax levy certificates, which, it is stated, were not commercially marketable at those rates. It is reported that the water-bond transaction alone will save the city $105,000 of interest charges.

### City to Make Industrial Survey.

Ore., Portland.—An industrial survey of the city has just been undertaken to find out what the city lacks which would make it more attractive than other coast ports as a location for industries. The city council, the commission of public docks and the port of Portland Commission have jointly appropriated $30,000 with which to carry on the investigations. Two important features are definitely expected to be added to the city's industrial assets as a result of the survey: Provision of a belt line railroad and the development at public expense of a large tract of land suitably located, with respect to rail and water terminals, for manufacturing purposes. Factory sites, with all public facilities, will then be leased or sold by the city at a nominal price.

## LEGAL NEWS

A Summary and Notes of Recent Decision—Rulings of Interest to Municipalities

### Readvertisement for Bids on Sewer Construction—Limit on Contract Price—Delay.

(Mo.) Where a municipal board advertised for bids for construction of a sewer and, after rejecting bids received under two advertisements, accepted the best bid and awarded the contract upon the third advertisement, at a price higher than lowest bid under first advertisement, its action was valid where taken in good faith.—Heman Const. Co. v. Lyon, 211 S. W. 68.

Where the charter in force did not limit the contract price for the construction of a city sewer to the amount of the estimate in the absence of a showing other than of good faith on the part of the board, the contractor should not be deprived of his right to be paid by enforcing special tax liens for an error in the board's judgment, where the actual cost of construction exceeded the estimated cost. —Id.

A contractor who has entered into a contract for construction of a sewer with reasonable promptitude and proceeded speedily to do the work in compliance therewith should not be defeated upon his claims under tax liens therefor on account of delay of the board in letting the contract not occasioned by the contractor.—Id.

### Acceptance of Sewer—Violation of Contract—Defective Specifications.

(Ore.) Payment by city for work accepted by it under sewer contract, under the honest belief that work was done in the manner required by the contract, did not release the surety—City of Seaside v. Randles, 180 P. 319. Where sewer contract expressly stipulated that inspector or engineer was without authority to accept or reject the work when not done according to the contract, contractor had no right to suppose that the city engineer or inspector was authorized to permit any deviation from the contract.—Id.

In city's action against sewer contractor for failure to construct sewer according to the contract, it was no defense that the plans and specifications were defective, and that sewer, if constructed in accordance therewith, would have been worthless.—Id.

The acceptance of work by municipality is only prima facie evidence that the work has been done in substantial compliance with the terms of the contract.—Id.

That work on a sewer contract was performed in the absence of city engineer or inspector in violation of a contract, without objection by either inspector or engineer, was not a waiver by city of defects in the work, although the engineer or inspector knew work was being imperfectly done, where contract provided that engineer and inspector should not have authority to accept or reject work not performed according to the contract.—Id.

That city did not see fit to reconstruct sewer in precisely the same manner and according to the same plans and specifications under provision in contract giving it the right to so do upon contractor's breach did not affect the right of the city to recover damages for breach by contractor.—Id.

### Negligence of City Employes Cleaning Sewer—City Liable for Injury.

(Ga. App.) While municipality is not ordinarily liable to private citizen for injury from negligence of board of health employes while engaged in work connected with preservation of public health, yet if negligence of employes of board of health, paid directly by city, in cleaning out a sewer and leaving an iron lid in opening in sewer under sidewalk so as to create a dangerous defect or destruction in sidewalk, with resulting injury to one exercising due care. it is liable.—City Council of Augusta v. Cleveland, 98 S. E. 738.

# NEWS OF THE SOCIETIES

**Sept. 23-26.**—INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. Annual convention, Chicago, Ill. Secretary, Clarence R. George, Houston, Tex.

**Sept. 30-Oct. 1-3.**—NEW ENGLAND WATERWORKS ASSOCIATION. Annual meeting, Albany, N. Y. Secretary, Tremont Temple, Boston, Mass.

**Oct. 1-4.**—NATIONAL SAFETY COUNCIL. Eighth annual congress, Cleveland, Ohio.

**Oct. 21-24.**—ILLUMINATING ENGINEERING SOCIETY. Annual convention, Chicago, Ill.

**Oct. 27-30.**—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, New Orleans, La. Secretary, A. W. Hedrich, 169 Massachusetts ave., Boston, Mass.

**Oct. 29-31.**—CITY MANAGERS' ASSOCIATION. Sixth annual meeting at Indianapolis, Ind. Secretary, Harrison G. Otis, Tribune Bldg., New York City.

**Nov. 12-14.**—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Springfield, Ill.

**Feb. 9-13, 1920.**—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention, Louisville, Ky. Secretary, E. L. Powers, 150 Nassau street, New York.

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### American Water Works Association.

Beginning with October 15, the office of the secretary of the society will be located at 153 West 71st street, New York City, instead of at Troy, N. Y., its present location.

An energetic campaign for new members is being conducted by the Membership Committee, F. C. Jordan, chairman, in an effort to increase the membership from 1,350 to 2,500. The society has decided to enlarge its activities, which will require more money; but instead of increasing the dues, will endeavor to increase the membership to meet the greater expenditure. There are estimated to be 7,500 waterworks officials, engineers, health officers and others who would make acceptable members of the society, and the enrolling of one-third of them is not believed to be impossible.

One of the additional expenditures is for the purpose of increasing the number of issues of the "Journal" of the society from four to six. Also larger funds are placed at the disposal of the special committees so that their research work and preparation of reports may be carried on more expeditiously.

Ballots have been distributed for votes for members of the Nominating Committee, the polls for which close at noon October 20.

Following are the members of the Nominating Committee nominated at the last convention, representing the districts of the Association:

District 1—Frank A. Barbour, Cons. Engr., 14 Beacon street, Boston.

District 2—Lyman P. Hapgood, superintendent water, Jamestown, N. Y.

District 3—George C. Gensheimer, secretary water commissioners, Erie, Pa.

District 4—Henry B. Morgan, manager water works, Peoria, Ill.; C. W. Wiles, superintendent water works, Delaware, O.

District 5—Francis T. Cutts, assistant water commissioner, 34 East Grand avenue, St. Louis; Chester R. McFarland, manager water works, Tampa, Fla.

District 6—F. W. Cappelen, city engineer, Minneapolis, Minn.; J. Chris. Jensen, municipal water works, Council Bluffs, Ia.

### Association of Ohio Technical Societies.

A state convention of the engineers and architects of Ohio will be held in Columbus, Ohio, on October 14 and 15 under the auspices of the Association of Ohio Technical Societies. Four principal subjects will be advanced. M. O. Leighton, chairman of the Engineers', Architects' and Constructors' Conference, will speak on "The National Department of Public Works"; Dr. F. H. Newell, of the American Association of Engineers, will speak on "Closer Co-operation in the Engineering Profession"; Charles Whiting Baker, consulting editor of the Engineering News-Record, will address the convention on the "Compensation of Engineers and Architects"; and Professor Gardner S. Williams of the University of Michigan will discuss the "Registration of Engineers and Architects."

### American Association of Engineers.

The North Carolina Society of Civil Engineers has voted to proceed with consolidation with the American Association of Engineers, and to carry out the affiliation as soon as the committee appointed to conduct the negotiations has completed its work. The president of the society is Dr. W. C. Riddick, president of North Carolina State College.

A 32-page progress report issued recently by the railroad committee of the American Association of Engineers contains the entire story of the negotiations which have been carried on by the association relative to increased salaries of railroad engineers, and which have been highly successful. The salary case of the railroad professional engineer was championed for the first time last October, when the association asked the Wage Board of the administration for a hearing at which the claims of these engineers might be presented. This hearing was finally obtained last March, just after a conference had been held in Chicago by the association, at which several hundred engineers adopted schedules of salaries for various positions which were underpaid. The hearing resulted in favorable action by the Wage Board, and the point was almost reached where the board was to issue a wage order placing new salaries into effect over the entire country. The movement for higher salaries looked like a complete success. Then came the blow. The administration took the matter out of the hands of the Wage Board. The Director of the Division of Operation advised national headquarters of A. A. E., however, that regional directors had been given authority and instructions to make proper adjustments of salaries in their respective regions. It was then necessary to conduct independent negotiations with each regional director. This occupied the railroad department of the association for almost three months; until, finally, the Northwestern Region issued the first order which had been issued in any region and which granted increases in salaries which brought the new rates approximately up to those which had been recommended by A. A. E. Since then the Eastern Region has announced that its new rates for professional engineers are ready in the rough, although they are not yet printed for distribution. Results are expected also in two other regions before the first of October. The report gives a resume of the history of the case to date, including reproduction of some of the correspondence. It will be mailed to interested persons who send in their names to national headquarters at 63 East Adams street, Chicago.

The most recently organized chapters of the American Association of Engineers are the Springfield, Mo., chapter, and that at Fresno, California. E. T. Bond is president of the Springfield chapter, and L. E. Smith is president of the Fresno chapter.

The committee of the American Association of Engineers on salaries of engineers in public service has been increased by the addition of J. H. Prior, consulting engineer of Chicago, who is also a member of the board of directors of the association. The municipal section of this committee has been partially organized with S. C. Hadden, editor of Municipal County Engineering, as chairman. The remainder of the committee will consist for the present of municipal engineers chosen with a view to giving adequate representation to every part of the country. The state highway engineer section has completed a tentative compensation which will be soon sent generally to highway engineers through the United States for suggestion and criticism. Plans are being formulated for the organization of another section, which as well as the state highway engineer section will be headed by A. N. Johnson, consulting highway engineer of the Portland Cement Association. It is expected that the state highway engineer schedule will be made public in November. The municipal schedule, it is hoped, will be ready for publication in December.

### Associated Engineers of Spokane.

The affiliated society of engineers that was organized in Spokane, Washington, several years ago, at a recent meeting changed the name from the Spokane Engineering and Technical Association to the Associated Engineers of Spokane, Washington.

# INDUSTRIAL NEWS

### Westinghouse Company Building Workers' Homes.

Due to the difficulty the employes of the WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY have experienced in getting homes near the East Pittsburgh Works, the company has resumed the home building program that was postponed during the war and forty-eight houses are now under construction. The site for the new dwellings is on a plot of 109 acres owned by the company and located in Wilkins township along Ardmore Boulevard.

The new houses will form a part of the general building plan for developing the entire tract. It is estimated this tract will furnish homes for six hundred families. Sidewalks and pavements will be laid, and gas, water and electricity services will be installed. The houses, which are modern in construction, will be of brick with hollow tile backing, with concrete cellars and cement porches. They will consist mainly of five, six and seven room houses designed to meet the needs and the pocketbook of the man in moderate circumstances and will be sold at cost on easy terms to the employes of the company. A number of the dwellings will be for rent.

In building the new homes an effort has been made to do away with features that have outlived their usefulness. The antiquated parlor is missing and the center hall has been replaced with a modern living room, which is more economical of space. However, the plans are subject to change, as the dwellings are designed to meet the approval of the future occupants, whether owners or tenants. Those in charge of the building program have made a careful study of the war-time houses erected by the Housing Commission, especially those built in the Philadelphia district for the use of the employes of the Essington Works.

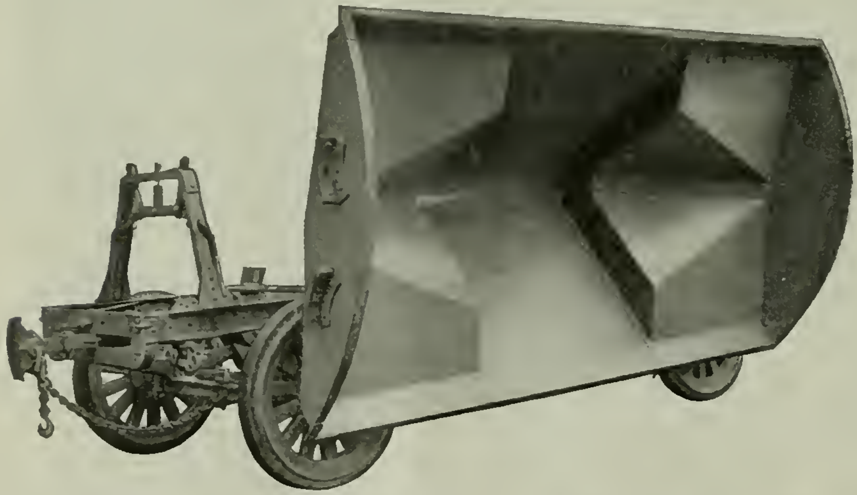
The Westinghouse Company is one of the pioneers in building homes for its employes, having constructed seventy-two homes near the Trafford Foundry almost ten years ago. It owns 127 apartments and homes in Trafford proper. It is probable that the building scheme at present under way will later include apartments and duplex houses. T. P. Gaylord, vice-president of the Westinghouse Company, is in charge of the building program. Bernard H. Prack, the architect and builder, expects to have the first of the houses ready for occupancy by October first.

# NEW APPLIANCES

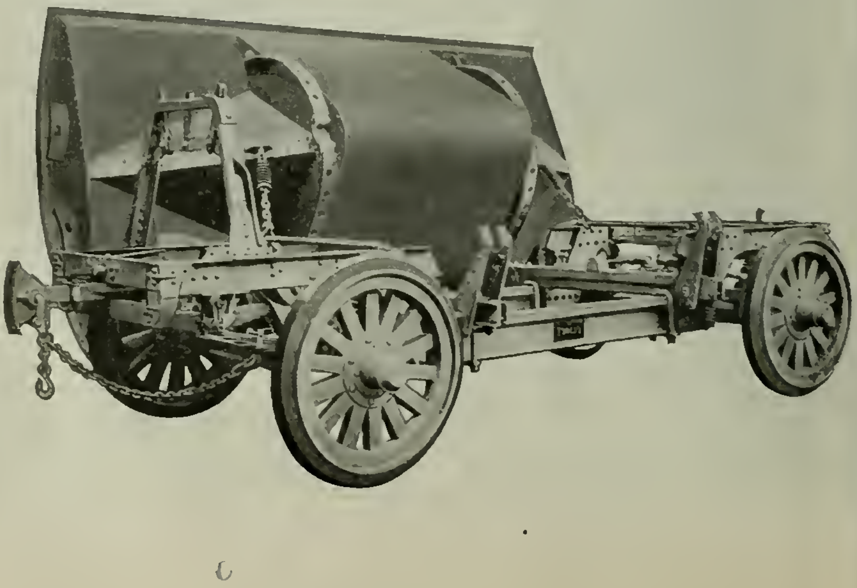
**Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.**

### New Ash and Garbage Trailer.

A new trailer to be used for collecting ashes and garbage and also for hauling dirt, sand and crushed stone has been placed on the market by the Troy Wagon Works Company, of Troy, Ohio. The body is of steel, made to stand the hard usage to which this service subjects it, and is water-tight. One of the principal features is that the height of the sides of the body from the ground is only sixty inches. This is made possible by the drop frame. This makes it easy to shovel material into the body or raise ash and garbage cans for emptying them into the same. The load is dumped by gravity, no power being needed either to dump it or to return the body to an upright position after dumping. The body discharges the load outside of the wheels.



ABOVE, VIEW OF INSIDE OF TRAILER, DUMPED. AT THE RIGHT, VIEW OF OUTSIDE OF BODY, DUMPED.



These trailers are fitted with a tongue attachment so that horses can be easily and quickly hitched to them, or unhitched from them when the trailers are to be picked up by a tractor to be transported to the dump, incinerator or other place of disposal. The wheel base is short, 115 inches, which makes it easy to turn into alleys or narrow streets.

Some of the more important dimensions and details are as follows: Capacity, 6,000 pounds, 44 cubic yards. Tread, 63½ inches. Ground clearance, 12 inches; frame length, 175 inches. Height of frame, 18 inches at the center and 32¾ inches at the ends. Loading edge of body, 60 inches above the ground. Axles, drop forge. Bearings, double cage roller. Springs, 2½-inch by 44-inch best grade spring steel. Wheels, standard artillery with hickory spokes. Tires, 36x5 solid rubber pressed on. Loading space, 66¾ inches at the center and 54⅛ inches at the ends. Overall width, 80 inches. Turning radius, 28 feet 3 inches, outside wheel. Weight, chassis 3,530 pounds, body 1,900 pounds, total 5,430 pounds.

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City County State

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*The Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.*

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## POSSIBLE DELAY IN FUTURE ISSUES.

As we go to press, indications are that practically all of the printers in New York City whose presses turn out periodicals and books will be closed by a strike of their employes after October 1. It is probable, therefore, that Municipal Journal & Public Works, like all other periodicals published in this city, will be unable to get out promptly the one or two issues following this one, and it takes this opportunity of asking its readers and advertisers to make allowances if the next few numbers do not reach them promptly.

Subscribers may rest assured, however, that we will do out best to make this interruption in service as brief as possible and make up for it by the increased excellence of future issues when they do appear.

## AN ENDOWMENT FUND FOR "BOSTON TECH."

Last spring, when most American institutions of collegiate grade had an attendance of only half to two-thirds normal, the Massachusetts Institute of Technology had more students than ever before, and the freshman class was almost double the old standard class. Fifty per cent of the applicants for the recently offered K. of C. scholarships for A. E. F. men were for training in engineering, the majority expressing a preference for "Boston Tech." Registrations for the present term have broken all records, and today the increased demand for the Tech type of education is taxing the entire M. I. T. capacity. There is no doubt about it, the war has put a premium upon technical education.

To the casual thinker it might seem that a great influx of students spells financial prosperity for the Institute, but this is not the case. In addition to the maintenance of buildings, it costs Technology $500 in round numbers to give a student a year's education. The tuition fee has recently been raised from $250 to $300 and the Institute has decided that it must not be raised again. Even this moderate fee bars the way for some young men who ought to have a technical education.

But although the tuition fee cannot go up, the cost of an M. I. T. education cannot come down—indeed, like everything else, it is mounting still higher. It is no longer possible to secure a good professor at a salary that a truck driver would disdain. Laboratory equipment is essential and expensive, but at present the increase in professors' salaries is even more vital than that.

The Massachusetts Institute of Technology believes that the best solution of this problem is an endowment fund. An adequate endowment will enable the Institute to cope with the high cost of living and to expand with its present opportunity. A "mysterious Mr. Smith" has started the ball rolling with a promise of $4,000,000 provided another $4,000,000 is raised by the alumni and friends of the Institute. "Mr. Smith" is not a Tech. man, but he is a firm believer in the Tech. type of education and its vital importance to the industrial America of the future.

Massachusetts Institute of Technology has for years been the leader in the education of men for municipal service. Perhaps the majority of men in public health work and sanitary engineering are alumni of this institution. Municipal and other governmental officials are therefore especially interested in the success of this movement to assure for the future not only the continuance of the work that has made it world-famous, but also an enlargement of its scope of usefulness.

## FELLOWSHIPS IN HIGHWAY ENGINEERING.

Two fellowships in Highway Engineering are offered by the University of Michigan, which will be awarded about October 10th.

The Detroit Edison Fellowship in Highway Engineering.—The Detroit Edison Company announced, under date of August 16, 1919, the renewal of a fellowship suspended during the war. This fellowship pays the holder $500 per year, with an allowance of $100 for expenses. It will be continued for the years 1919-1920 and 1920-1921. The investigation will be the subject of Moderate-Cost Country Roads.

The R. D. Chapin Fellowship in Highway Engineering.—On August 29th, R. D. Chapin of Detroit, president of the Hudson Motor Car Company, renewed the fellowship given by him prior to the war. This fellowship is offered to provide for the study of hard-surface roads and pavements. It pays the sum of $500 to the holder, with an allowance of $100 for expenses. It is available for the year 1919-1920.

Appointments of 1919-1920 Fellows have not been made. All candidates applying up to October 10th will be considered. A Fellow must have a Bachelor's degree in Civil Engineering from a college of recognized standing, he must enroll as a candidate for the degree of Master of Science in Engineering and be in residence at the University for eight months.

The above information is furnished by Prof. Arthur H. Blanchard, who has recently been made professor of highway engineering at the University of Michigan.

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# RESURFACING OLD BRICK PAVEMENT

### One Twenty-three Years Old in White Plains, N. Y., Being Covered with Two Inches of Bitulithic—Method of Preparing Old Pavement for New Surface—Handling Traffic During Construction.

In the larger cities and most of the smaller ones, a considerable percentage of the streets have now been paved with more or less durable pavement and the problem that is becoming increasingly more important is that of repairing or renewing surfaces of the pavements as they wear out. Municipal Journal and Public Works has already described methods of resurfacing stone block pavement and the various bituminous ones. In this article we will describe a method being employed for renewing the surface of a worn brick pavement.

The work in question is being done in the village of White Plains, which is the county seat of Westchester county, N. Y., and is located halfway between Long Island sound on the east and the Hudson river on the west and is 22 miles north of New York City. A large percentage of the citizens of the village and the surrounding county own their own automobiles, many of the wealthy New Yorkers whose homes are located on the "Westchester knobs" having from one to three cars each. In addition to these, on every pleasant day thousands of New Yorkers in heavy touring cars use the highways of the county, while motor trucks of the light delivery type, the medium heavy truck used for department store delivery, and the heaviest ones used by contractors, are seen in great numbers. Altogether, it is probable that the highways of this county carry a heavier motor traffic than those of any other in the United States.

Most of the improved and heavily traveled highways are those leading north from New York. There is only one direct highway east and west across the county, connecting the Boston post road on the sound with the Albany post road which follows the Hudson river. This connecting link passes through White Plains, and Main street of that village forms a part of this highway. It is apparent, therefore, that this street is subjected to a much more severe use than are similar streets in most cities of the same population—20,000.

Cars from four lines pass over this street to and from the railroad station, running on a twenty-minute schedule each way, or averaging ten minutes apart. This is the principal business street of the village, and on it are all the retail stores and banks and the county courthouse. On account of the narrow roadway, automobiles are prohibited from parking more than six inches away from the curb, but even so, the space available between these and the passing street-cars requires careful driving.

In 1896, twenty-three years ago, when the population was about 9,000, a brick pavement was laid in this street on a six-inch concrete foundation. The roadway is only 33 feet wide and a single-track streetcar line runs through the centre of it, leaving about 14 feet between the track and each curb. As automobiles are continually standing along the curbs, this means that most of the traffic is confined to a 7-foot strip between the parked automobiles and the track—a condition that is known to produce the most intensive wear. In spite of this, this brick pavement has continued to give good service for twenty-three years, with occasional repairs at different points. The wear, however, has increased in rapidity with the development of traffic and in some places the bricks had worn down to a thickness of only one inch.

By the end of last year the condition of this pavement was such that it was necessary to either remove all of the old brick surface and put down a new pavement, or cover the old pavement with a new surfacing material. Commissioner of Public Works, W. H. Lyon, decided that the most economical and practical thing to do was to resurface over the old brick, it having been found by levels on the roadway that it would be possible to put a two-inch surface over most of the area of the present roadway and still leave a four-inch face of curb between the top of the curb and the pavement. In order to do this, however, considerable work was required to prepare the old brick pavement to receive the new surface. A contract for this work was let to Warren Brothers Company and the work was begun on Aug. 6 of this year and will probably be finished by Sept. 30; the unusual number o rainy days during August and September alone preventing its having been completed two weeks earlier.

The space between the rails of the street car track ha been renewed with brick a few years ago and is still in good condition, and the resurfacing now being done is confined to the portions of the roadway between the track and the curbs. The length of street which is being resurfaced is three thousand feet.

In performing the contract, the contractors have left one side of the street always open for traffic, completing the resurfacing for the entire length of one side before beginning on the other. In addition, only two rather short blocks are closed to traffic at a time, thus limiting to that distance the interference with traffic on that side of the roadway.

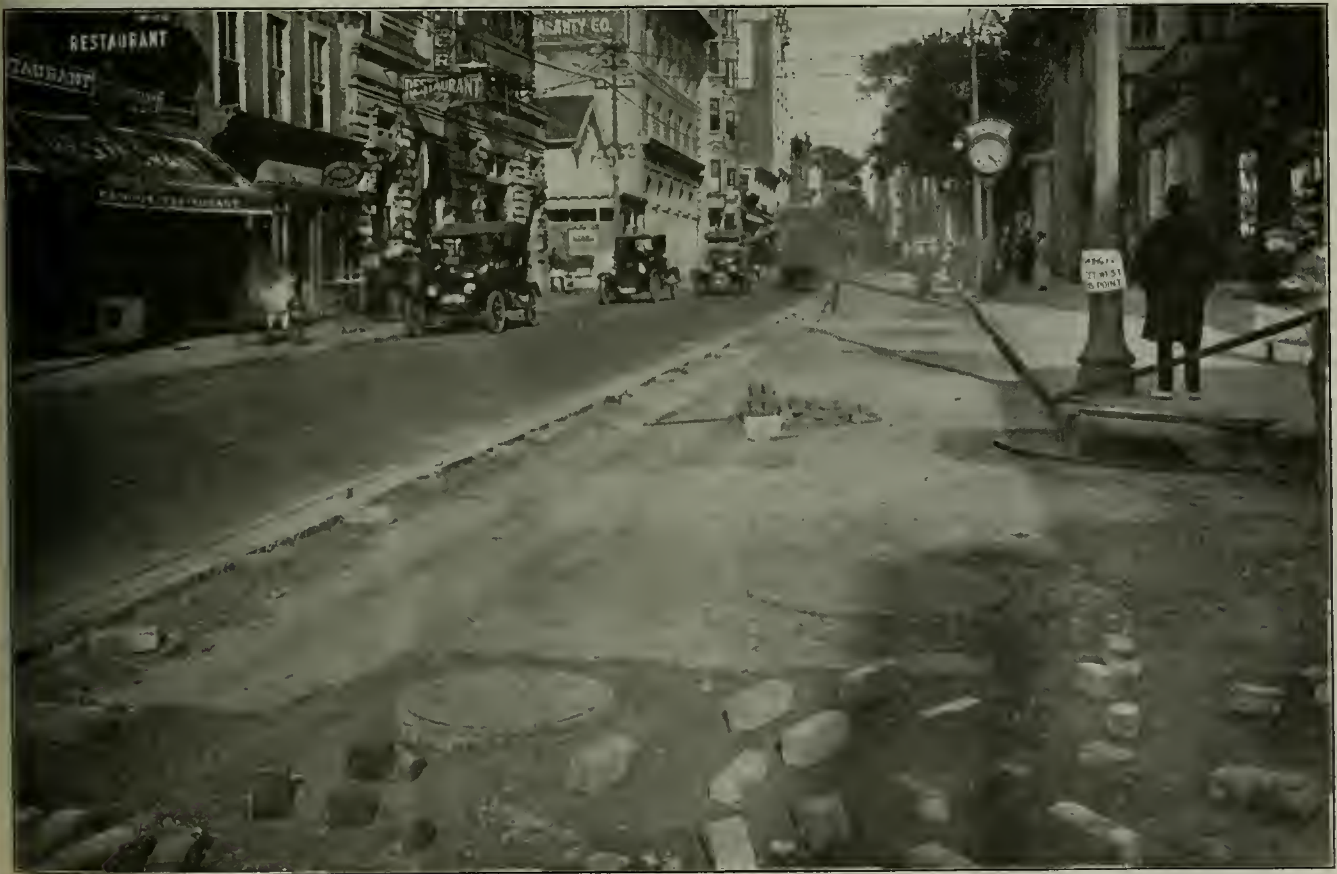
CORD RESTING ON SURFACE SHOWS UNEVENNESS OF OLD PAVEMENT.

The surfacing is of bitulithic and two inches thick throughout. Where the old pavement contains depressions extending more than three inches below the finished surface, these depressions are filled with concrete brought up to two inches below finished grade. Where the depressions are between two and three inches below finished grade, they are filled with an asphaltic binder. Where the old surface extends above the two-inch grade, the old brick are removed entirely and the space filled with concrete brought up to the desired surface.

Along each side of the car track for a distance of two feet out from the rails, the old brick are removed entirely. The web space in the rails had been filled with concrete when the brick pavement was laid, and in general this web filling is still in good condition, but where necessary it is repaired with new concrete. Following this, two rows of creosoted wood blocks are laid along the rail as liners, being set in cement mortar on top of the old foundation, which mortar is generally about one inch thick. A cement grout composed of one cement to two sand is poured into the joints and brushed in. The outside vertical faces of the wood blocks are painted with asphalt, and the remainder of the two-foot strip, between the wood blocks and the old brick surface, is then brought up to two inches below grade with concrete.

When this work has been completed, there is a space about 13 feet wide between the wood block liners and the curb which has an approximately uniform surface two inches lower than the finished grade of the street. The bitulithic is laid on this surface in the ordinary way. It is mixed at a plant located at Larchmont, seven and a half miles distant and is brought to the job in five-ton motor trucks. These trucks are hired from local owners at $30 a day with the understanding that each truck shall bring four loads, making the cost of hauling $1.50 a ton. The contractor estimates that this is cheaper than hauling it with teams.

On reaching the street, the material is dumped upon the prepared roadway and is spread by hand, all of the dumped material being rehandled. Along the curb and the car track it is tamped by hand, following which the whole surface is rolled with a 12-ton Buffalo-Pitts roller



ON THE RIGHT, STREET READY FOR SURFACE MATERIAL.ON THE LEFT, NEW SURFACE COMPLETED AND IN USE

LAYING WOOD BLOCK LINERS AND SWEEPING GROUT INTO THEIR JOINTS.

until it is cold. Traffic is turned onto each stretch of completed pavement four hours after the rolling has stopped.

The contract price for this pavement was $2.50 per square yard, this including all of the preparation of the old brick pavement above described as well as the application of the new surface.

## CONTRACTORS' BONDS FOR NEW YORK HIGHWAY WORK.

The legislature of New York State this year amended the highway law so as to provide for changes in that part relating to proposals, bonds and payments.

Under the new law, "Accompanying each proposal there shall be a draft or certified check for three per centum of the amount of the gross sum bid, which check, in case such proposal be accepted, shall be retained by the state comission of highways until the contract, and the bond hereinafter provided for, shall have been duly executed, whereupon such check shall be returned to the bidder. In case the bidder to whom the contract shall be awarded shall fail to execute such contract and bond, the moneys represented by such draft or certified check shall be regarded as liquidated damages and shall be forfeited to the state and shall be deposited by the commissioner with the state treasurer to the credit of the fund available for the construction of said highway; *provided, however, that should the bidder request the commission to dispense with a bond as provided in subdivision seven of this section, such check shall be retained by the commission until fifteen per centum of the work under the contract has been accomplished,* as determined according to the estimates from time to time approved by the commission as a basis for payments on the contract, and should the bidder to whom the contract shall be awarded fail to execute such contract or fail to progress the work embraced within such contract until such time as fifteen percentum of the work shall have been accomplished, the moneys represented by such draft or certified check shall be regarded as liquidated damages and shall be forfeited to the state and shall be deposited by the commissioner with the state treasurer to the credit of the fund available for the construction of said highway. The proposals when opened shall be subject at all reasonable times to public inspection, and at the time of opening shall be publicly read and conspicuously posted in such a manner as to indicate the several items of the proposal.

"7. Bond of contractor. Unless a bond be dispensed with as hereinafter provided, each contractor, before entering into a contract for such construction or improvement, shall execute a bond in the form prescribed by the commission, with sufficient sureties, to be approved by the commission, conditioned that he will perform the work in accordance with the terms of the contract, and with the plans and specifications, and that he will commence and complete the work within the time prescribed in the contract; *provided, however, that the commission shall, at the time of the execution of the contract, upon the written request of the contractor, dispense with the giving of said bonds; but in any such case twenty per centum of the contract price shall be retained until the entire work has been completed and accepted.* The bond, if given, shall also provide against any direct or indirect damages that shall be suffered or claimed on account of such construction or improvement during the time thereof, and until the highway is accepted.

"8. Payments on contract. The contract may provide for partial payments to an amount not exceeding ninety per centum, or *in a case where the bond is dispensed with, eighty per centum,* of the value of the work done, which shall be paid in the manner provided by this article, when certified to by the commission. Ten per centum of the contract price, where a bond approved by the commission is given, and twenty per centum in case said bond is dispensed with, shall be retained until the entire work has been completed and accepted."

## HIGHWAYS TRANSPORT COMMITTEE DISCONTINUED.

The Highways Transport Committee, which was established by the United States Council of National Defense as a necessary adjunct to its war-time activities, ha been discontinued as of Sept. 15, 1919.

The Highways Transport Committee was continue through the readjustment period up to Sept. 15 in orde that such of its work as was initiated under war-tim conditions might be tapered down to a point where i could properly be closed. The chief reasons for dissolving the committee were necessary curtailment of expenditures and the apparent fact that the war-time functions of the committee did not with sufficient explicitness fall within the peace-time activities of the Counci as laid down by the congressional act creating it.

Certain surveys, more recently initiated by the committee, logically related to the permanent research wor of the Council, are being continued. The Council, b order of the President, recently took over the records an files of the War Industries Board, originally created b the Council, and of the Committee on Public Informatio All of this material will be studied, and, where practicabl kept up-to-date in so far as it bears on the national d fense.

## CHANGE FROM PRIVATE TO MUNICIPAL OWNERSHIP.

Under the title "One Hundred Reasons why One Hundred Cities Have Changed from Private to Municipal Ownership of Their Public Utilities," Burns & McDonnell, consulting engineers, have published a pamphlet of sixteen pages which give, in brief paragraphs and quotations, ideas on the subject which should be of great interest to all cities whose utilities are now privately owned. A copy of this pamphlet will be sent to anyone interested in the subject. The address of the firm is Interstate Building, Kansas City, Mo.

## SPANISH ENGINEER DESIRES MUNICIPAL REPORTS.

The city engineer of Barcelona, Spain, Jose Me de Lasarte, has been asked by the president of the city council of that city to endeavor to secure copies of technical reports issued by American municipalities for the use of the city council development committee, in order that it may become more familiar with American municipal practice. We believe it is the intention of the council to send their own municipal reports in exchange. Cities are asked to send the reports to the Ayunteamiento de Barcelona, Consejo de Cultura, Barcelona, Spain.

## FIRE LADDER IN SURVEYING WORK.

The Topographical Survey Commission of Baltimore last year surveyed and marked the new boundary line of the city, about forty miles long, created by the annexation of territory, as described in our issue of January 11th, 1919. In connection with this work there was what we believe to be a unique use of fire apparatus.

The plan adopted established twenty-five triangulation stations located as near as possible to the new boundary line. In selecting the locations for these stations, the survey commission was greatly helped by the Board of Fire Commissioners, who supplied the engineers with one of their motor trucks equipped with an extension ladder, which was raised at certain points and ascended by members of the survey corps to make a reconnaissance. This proved to be a very rapid and effective method of determining upon these locations.

## BITUMINOUS TREATMENT OF PRIVATE ROADS.

Owners of large farms and rural estates seeking a more satisfactory type of entrance road have applied to the Bureau of Public Roads of the United States Department of Agriculture for advice regarding the application of bituminous material on main entrance and much-traveled farm lanes.

The bureau's engineers point out that such applications may be made successfully on any farm road which has already been constructed of stone, gravel, or other similar material, and is in a thoroughly compacted and reasonably smooth condition. A coal-tar preparation applied cold, or an asphaltic oil, can be used and if applied by the farm employes, the cost should not exceed seven or eight cents a square yard for materials. The compacted gravel or stone roads should be thoroughly cleaned of dust and the bitumen applied with ordinary sprinkling pots from which the perforated nozzle has been removed and the spout carefully flattened into a symmetrical rectangular opening about one-quarter of an inch wide, so that the material may be poured in a broad, flat stream. If a large amount of work is to be done, a specially designed pouring can may be purchased of dealers in road equipment. Care should be taken to have an even distribution, and the quantity applied should be approximately one-half gallon to a square yard of road surface. After applying the bituminous material clean gravel or stone chips should be spread evenly over the surface, and if possible, rolled with a lawn or field roller. Where gravel or chips are not available, clean coarse sand will serve as covering material. It should be spread in sufficient quatity to prevent the bituminous material from adhering to tires of passing vehicles. Attention is called to the fact that this treatment should not be made where drainage from the stables or barns will flow over it. Where mudholes are likely to form around hitching posts or at stable entrances, if a more durable pavement is desired, a section of concrete slab should be laid.

## A SEWAGE TREATMENT EXPERIMENT.

### Being Conducted at Mt. Vernon Sewage Treatment Plant on Modified Activated Sludge Process and a New Drum Screen.

The use, in the Milwaukee experimental sewage treatment plant, of what is known as a "Dorr Thickener" for preventing the trouble experienced with activated sludge tanks because the sludge collected in the tanks and became septic, was described in our issue of October 18th, 1917, by the chief engineer of the Sewerage Commission, T. Chalkley Hatton. A short time ago there was put into operation another experimental plant making use of the thickener, the object of which is to develop more efficient application of the activated sludge method.

The plant in question is located on the grounds of the sewage treatment plant of Mt. Vernon, N. Y., and was designed and is being operated by the Dorr Co. Sewage is taken from just below the bar screen of the city plant and flows by gravity to a pumping station, where it is pumped into an elevated tank built of wood staves, first passing through a screen. Both the pump and the air compressor are run by electricity, as are also the rotary screen and the thickeners. There are two tanks which may be called the aerating and the sedimentation tanks, respectively, each of which contains a thickener.

The plant has been changed more or less as its operation suggested improvements, and only recently has it settled down to continuous, uniform operation with routine tests to determine the efficiency. Some results have already been obtained, however, that appear as conclusive as could be expected from a 50,000-gallon experimental plant, while others appear to be promising. The experimenters desire not to make public the general plan or the details of the tank construction, which may be changed more or less; but as it stands, the amount of air used for activation is said to be only about one-third as great as in the Milwaukee plant, while the effect as indicated by the effluent is fully as good.

The sewage is quite strong city sewage. During three days of last week the suspended solids averaged 256 parts per million in the influent to the tanks (after screening) and 48 parts in the tank effluent. The reduction effected in the tanks has averaged 40 to 60 per cent of the total solids, 80 to 96 per cent of suspended solids, and 13 to 40 per cent of dissolved solids. The reducing power of the influent runs about 100 to 150, and that of the effluent 10 to 25. The color by the methylene blue test remains for several weeks. The percentage of suspended matter removed by the tanks would, of course, show up better if none of the coarse vegetable matter had been removed by the screen; the amount so removed averaging about 500 pounds per million gallons.

The effectiveness of the screen appears to have been demonstrated without further test, although it will, of course, be continued in use in the plant. The screen is practically that furnished by the company under the name of "Dorco" for clarifying trade wastes, but has not previously been used for sewage. It is a drum screen, the ends of the drum being solid while the circumferential surface consists of a wire screen, 24 meshes to the inch, 25-gauge wire. The drum is 4 feet in diameter and the screen face is 12 inches wide. The drum revolves in a box, into which the crude sewage flows and enters the drum through the screen, leaving the drum through an opening in one end a little below the level of the sewage in the box. The suspended matters remain in the box, in which the sewage is churned up by the revolving screen drum and all of the fecal matter ultimately comminuted so as to pass through the screen. Matters such as matches, corn kernels, corks, etc., that resist the macerating and churning action, are removed from the box from time to time, clean and giving off practically no odor. These matters, as stated, average about 500 pounds per million gallons. Through this screen about 50,000 to 60,000 gallons a day pass, and it is claimed that half a million gallons a day could be screened.

The most interesting feature of the screen is the manner in which it cleans itself. As each successive part of the screen rises out of the water, it is seen to be covered with solid sewage matters. The clarified sewage inside the drum is caused to partly revolve by the revolution of the drum, its surface standing lower than that in the box outside at the descending part of the circumference, and higher at the ascending side. The former condition permits sewage to enter the drum through the screen on the descending side, and the latter causes clarified sewage to flow out through the screen on the ascending side. The latter action washes off matters adhering to the outside, taking the place of the water jet or steam jet used in other drum screens. The velocity of revolution of the screen, size of box, relative elevation of water outside and inside the drum and other conditions all affect the effectiveness of this automatic cleaning. When visited a few days ago, the screen, as it passed over the top in its revolving, appeared to be perfectly clean except for a few feathers. The writer was told that feathers are about the only things that are not removed automatically, an occasional one catching in the meshes and having to be removed by hand. As few feathers reach a sewer, once a day would seem to suffice for removing them.

Apparently the screen can be made as fine as desired up to the finest wire cloth that is woven. Fecal matters are not screened out, but their comminution could probably be prevented, if desired, by different construction of the containing box. In general, however, it would seem that the removal of such easily putrescible matters with the screenings would not be desirable. The axle of the drum rests on ordinary journal bearings and carries only the weight of the drum, and the latter requires only a fraction of a horsepower to revolve it. The head lost is perhaps an inch; but this would naturally increase with the fineness of the screen and the volume of sewage treated per day.

The plant is operated continuously, night and day, and the experiments are being made carefully. All the air that leaves the condenser is measured by a recording meter. The effluent passes over a triangular weir and the head on the weir is read at frequent intervals on a gauge, and is also recorded automatically by means of a liquid level gauge. Knowledge of the amounts of air and sewage is thus not dependent upon the faithfulness of attendants. The excellently appointed laboratory of the municipal plant is used for making the chemical analyses. No analysis is made of the crude, unscreened sewage because of the impossibility of making proper allowance for the feces and other solid matters in it; but the total suspended solids are taken to be those shown by analysis of the screen effluent, plus the matter removed by the screen in a day divided by the amount of sewage screened in that time.

## STREET CLEANING AND REFUSE COLLECTION IN NEWARK.*

### Details of Collection Service—Records of Men and Teams Employed, Amount and Nature of Work Performed, and Personal Efficiency.

The withholding of the garbage from the refuse dumps on the meadows and delivering it to the piggery removed the salvagable bones from which the dump contractor had been obtaining a part of his profit, but he continues to pay the same sum for the salvage privilege in connection with the ashes and rubbish alone.

Having provided for the utilization of the garbage, the department is now making plans for more satisfactorily disposing of the ashes and rubbish. The lengths of haul of this material onto the meadows average about two and a half miles from the center of the city and reach a maximum distance of about four and a half miles, and considerable saving would result from eliminating the rubbish from this long haul. Also, while the city utilizes the material for desired filling, in the grading of streets on the meadows, the ashes alone would be preferable for this purpose. Plans are now being prepared for the establishing in the southwestern part o the city, of a refuse plant where the rubbish can be sorted over and the useless material burned. The city already owns a site adjoining the railroad yards of the Lehigh Valley railroad, that is suitable for such a plant. A rough estimate of the plant contemplated gives its cos as about $150,000, although $100,000 would probably hav been sufficient to construct it a year or two ago.

It is the idea of the department to own the plant and lease it to a contractor, who would pay to the city a sum to be decided by competitive bidding, which would cove the lease and the privilege of salvaging from the rubbish whatever material the contractor was able to dispose of. The city already has received an informal offe of $7,500 for the privilege and probably under competitio this sum would be considerably increased.

COLLECTING REFUSE.

As stated, the city now hires all the horses used i the collecting service, except that occasionally when few additional horses are needed for a day or two the are taken from the street cleaning stables. This ha proven unsatisfactory because of the power of the hors owners to impose terms on the city, and it is hoped tha the city can acquire its own horses and the necessar stables. Owing to the large area covered by the city it would seem desirable to have three stables so locate as to serve the various sections with the least length c useless travel. One of these stables may be provide by purchasing an excellently appointed stable capabl of housing eighty horses which was used by a brewery before the prohibition law put it out of operation.

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* Continued from page 182.

At present the city is making collections of garbage three times a week and of ashes and rubbish twice a week; although the latter is thought to be unnecessary and one service a week will probably be the rule for a large part of the city after this year. For ashes and rubbish, the city uses five-yard bottom-dump Watson wagons always go to the dump well covered; while have been provided with a metal cover known as the "Philadelphia sanitary ash top," while 25 more wagons are soon to be provided with similar tops. This top is semi-cylindrical in shape and contains four sliding covers, two on each side, so that only one-fourth of the top is open while the wagon is being loaded. The chief advantage of this top is said by Mr. Costello to be that "the load is always covered, dirt and dust do not fly in the face of pedestrians while being loaded; as there is no draft through, and, regardless of weather conditions, wagons always go to the dump well covered; while with the old canvas cover, under abnormal weather conditions it becomes frozen and is very hard to handle and fasten securely, in consequence of which much material is jolted off the wagon." For collecting the garbage, the city uses four-yard wagons, end dump, made of steel and water tight.

In making collections, a man goes ahead of each wagon and removes the garbage and other refuse receptacles from the house to the curb, thus eliminating delaying the collecting wagon. The empty receptacles are returned to the house by the householder and not by the city employes.

The collection service is in charge of a general superintendent and two assistant superintendents, each having charge of about one-half the area of the city. (A third assistant superintendent has charge of the dumps and equipment.) The city is divided into fifteen districts, each of which is in charge of a foreman. Last year there were seventeen districts, but Mr. Costello found it possible by readjustment to reduce the number to fifteen and thus reduce the collecting force by about ten per cent.

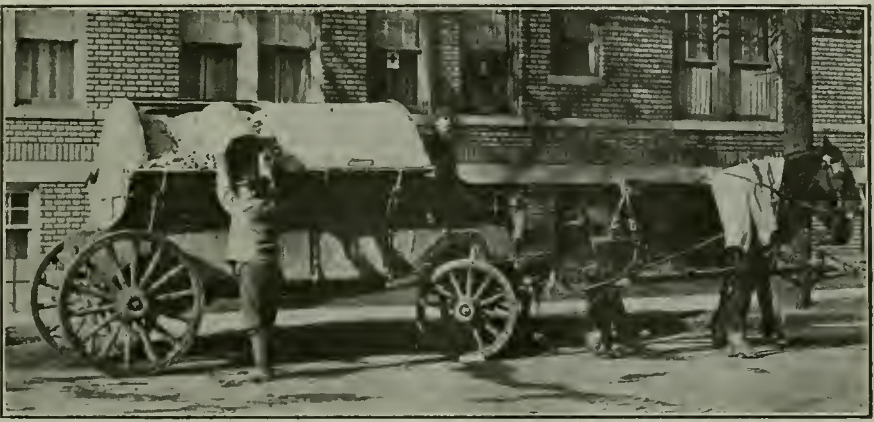
### SERVICE RECORDS.

Records of the service are being kept and checked, and by the end of the year some very interesting and valueable data will be available. In fact, much has already been recorded in the office, which shows that the systematizing of the work will prove profitable. For instance, the considerable increase in pay of laborers and horses had added $120,000 a year to that which would have been paid for the same service under last year's rates; in spite of which, the monthly total costs of operating the department during 1919 have been running considerably less than for the corresponding months of 1918, and the yearly total will be less than the 1918 total unless the 10-dollar rate for teams recently granted should more then wipe out all the savings effected.

The reports required by foremen and assistant superintendents, and the records made from these in the office, if made out and checked as designed, should furnish a very accurate and complete record of the work done in both collection and street cleaning.

The foreman of each refuse collection district is required to turn in daily a slip giving the number of each wagon in service that day, number of men and number of loads hauled, and whether ashes, garbage, rubbish, or mixed; whether the district was all cleaned and, if not, what area was not cleaned; the total number of carriers and loaders; the total number of teams, classified as hired or city owned; the total number of loads; and the time finished. Also, for each wagon, the time it started work, the time it left the district with the first, second, etc., load and the time it returned to the district from each trip, and the total number of loads. The condition of weather also is recorded.

The dump checker at each dump gives to each driver, on each trip, a receipt stating the date, wagon number, name of the dump and name of the checker. These drivers' receipts are used in case of conflict in the records. The receipts are numbered serially and are bound in books, each receipt having its stub, on which stub is recorded the date, wagon number, kind of material hauled, quantity in the yards, time dumped, name of the dump, and name of checker. The time dumped, combined with the records of the district foremen, permit the movements of each driver to be checked up, and prevent his surreptitiously selling the refuse or dumping it elsewhere.



ASH-COLLECTING WAGON, FITTED WITH SPECIAL TOP.

Each of the two assistant superintendents makes a daily report, on which is recorded the district number and foreman of the district for each of the several districts in his charge, and also for each district the number of loaders and pullers (a puller is a man who removes the refuse receptacle from the house to the curb), number of hired teams and number of city teams; also remarks as to the condition of each of the several districts at the end of the day and a general statement as to whether all districts are cleaned and if not, how many were left unfinished.

In the office there is made out from the reports above described a daily office record, which gives the record for each wagon, indicated by number. For each wagon there is indicated the number of loads hauled as reported by the district foreman, the number of loads for this wagon at each of the three dumps and the total at all dumps, and whether the number of loads so checked is under or over the number reported by the foreman. This daily record, it can be seen, is largely for the purpose of checking up the reports as to number of loads hauled.

There is also a daily record kept of the garbage delivered, this record being filled out at the hog farm. Each horizontal line records the wagon number or truck number, number of district it came from, time it arrived, time dumped, the weight and condition of garbage; also a space for remarks. At the top of the sheet is given the date and condition of weather.

Finally there is a general report of all the services performed in each district, there being a line for each district and the headings of the columns being as follows: District number. Foreman and assistant foreman. Ashes—Men (carriers or loaders); hired teams, loads; city teams, loads; total number of loads. Garbage—Men; hired teams, loads; city teams, loads; total number of loads. Rubbish—Men (carriers or loaders); hired teams, loads; city teams, loads; single hired horses, loads; single city horses, loads; total number of loads. Time finished—ashes, garbage, rubbish. Loads left out—ashes, garbage, rubbish. Total number of men. Total hired teams. Total single hired horses. Total city teams. Total single city horses. Total number of loads. Remarks. On this sheet also the date and the weather are recorded, as is the case for all daily reports and records.

For the street cleaning division, there is handed in by each foreman a daily report giving the badge number and name of each man working under him; the number of each wagon and the owner of the team hauling it, the time the team was in service and the number of loads hauled. Also the total number of regular men and of extra men, total number of hired teams and loads removed by them, of city teams and loads removed by them, and of carts and loads removed by them. Also the machine brooms, flushers and sprinklers in service.

The assistant superintendent hands in a daily report giving, for each district, the name of the foreman in charge, the number of regular and extra men, the number of hired teams and city teams and of city carts; and remarks as to condition of each district at the end of the day's work.

In the office is filled out each day a district report giving for each district the number of regular and of extra men; of hired teams and loads, city teams and loads carried, city carts and loads carried; time finished; total number of men, of teams, of loads; number of machine brooms, flushers, and sprinklers at work. Special lines of the report are provided for tow teams and men on the dumps.

A daily report is made out at the stables by the stable superintendent, giving the name of each man in service, his title, the name of his foreman and the machine brooms, sprinklers, sand spreaders, wagons and carts that are taken out from the stable for use, the number of loads of street sweepings, ashes, rubbish or other material hauled. the time each piece of equipment left the stable, the time it returned, and the time elapsed. This is totaled up at the bottom, where is given the total number of drivers, total number of stable men, of mechanics, of laborers, of teams and of singles.

An efficiency record of each man employed in the street cleaning division is kept by each foreman or other man having employes in his immediate charge. This record gives the number of each man, whether regular or extra man, his name, whether his record for the month has been good or poor, and whether he has left the service, been suspended or discharged and the date on which this occurred. There is made out for each man a card with spaces for a year's records, giving his name, address, date appointed and title, what service he was assigned to and what, if any, he was transferred to. As each monthly report giving his record is turned in, this record is entered on his card by checking under the word "good" or "poor" and giving the name of the party by whom this report was made. In this way there is always available a record of the satisfactoriness of the man's performance of his duties, which record can be used when it is necessary to lay off men or in making promotions or transfers.

The refuse collection division has a regular complaint service, and complaints which are sent in by telephone are recorded on a blank giving the district number, date, name of complainant and his address or location, nature of complaint, and whom the complaint was referred to for investigation. This is made in duplicate and the original is turned over to the district foreman or other official for investigation. On the bottom of the same slip is a space in which to record the result of the investigation, together with the signature and title of the person making the report. A ruling is printed on this slip that each complaint must be investigated and report returned within three days of the date of complaint. Where complaints are sent in by letter, a letter-size record is kept in the files on which is given the name of complainant and address and the report giving the result of the investigation, together with the reference number of the letter in which the complaint was made, so that the letter can readily be located in the files at any time. Each month there is made out a record of the total number of complaints for each district, giving the name of the foreman of the district, the number of complaints during each day of the month, the total number of complaints for the month, and a column of remarks. In this way it can be seen at a glance what districts appear to be furnishing the most cause for complaint by the citizens, and which the least cause.

## NATIONAL CONFERENCE ON PUBLIC OWNERSHIP.

A call for a conference on public ownership has been issued by the Public Ownership League of America, the conference to be held in Chicago on Saturday, Sunday and Monday, November 15, 16 and 17. Some 40 different labor, farmer, civic and other bodies have joined in the call.

The general purpose of the conference, as stated in the call, is to "study the problems of public ownership; to get the ideas of the most careful and competent utility experts in America; to hear the methods and plans of those who have made a success of public ownership in this and other countries; and to devise way and means for the advancement of the public ownership, efficient operation and democratic control of public utilities."

The first and most important subject on the program is the railroad question and the Plumb Plan of the Railway Brotherhoods. This will be handled by Glenn E. Plumb himself and by other equally prominent men and will be considered from every angle, including the opposition. The United States Chamber of Commerce has been asked to select a representative to take the negative side of a debate on the question.

Next in importance will be the discussion of the present street car crisis. M. M. O'Shaughnessy, of the San Francisco Municipal Street Car lines, Thomas H. Murphine of the Seattle Municipal Lines, Mayor Couzens of Detroit, Delos F. Wilcox, the utility expert, and others, have been invited to handle this subject.

Sir Adam Beck of the great Hydro-Electric Power Commission of Ontario, the greatest publicly owned utility of its kind on the American Continent, has been asked to lead in the discussion of public electric light and power plants.

Governor Lynn D. Frazier and other representatives of the Nonpartisan League have been asked to present the various phases of public ownership put into operation in North Dakota, while James H. Maurer, president of the Pennsylvania State Federation of Labor, and other representatives of organized labor, will present labor's views of the problem, especial attention being given to the plan of the United Mine Workers for the nationalization of the mines.

Thus every progressive group in the nation and Canada and all important phases of the problem will be discussed. All liberal and progressive people and all organizations interested in working out in a nonpartisan constructive way the solution of the nation's great public utility problems are invited and urged to attend.

The forty-seven bodies that have joined in the call are mostly labor organizations, twelve being unions of railroad employes and seventeen being other labor organizations; ten are local public ownership leagues, and the remainder are commercial and other civic associations.

The call apparently is not for a discussion as to the advisability of public ownership, but for consideration of how such ownership can best be put into practice. In the call it is said: "Regulation as a program for the solution of our public utility problems has broken down. Even in its most recent and highly developed forms, as in the case of the railways, it has failed. Everywhere, more and more, the people are turning to public ownership."

The subjects covered by the program published include the railway problem; municipal electric light and power plants, water works, gas plants, markets and terminal facilities; packing plants, telegraph, telephone, mines, waterways and other natural resources, and "public ownership of government and of congress."

## WATERSHED RUN-OFF IN ONTARIO.

### Results of Stream Flow and Rainfall Measurements at Forty-eight Stations During 1918—Inches on Watershed and Percentage of Rainfall.

The Hydro-Electric Power Commission of the province of Ontario has recently published a report for the year 1918 giving the results of stream flow measurements made during the year ending September 30, 1918. There are forty-eight stations in the province at which systematic determinations of stream flow are made. The commission states that the important rivers, from a power or a statistical point of view, in the part of the province south and east of North Bay may be considered to be satisfactorily under observation, but that the same cannot be said of the far larger remaining portion, many parts of which are not easily accessible. The number of stations at which rainfall is continuously observed in some of the drainage basins is not large, and the percentages of run-off to rainfall given in the report are sometimes based on the records of only one station in a large area, so that the rainfall recorded at such a station may differ very materially from the true mean for the area in question.

The record for each of the 48 stations gives the location of the station, the records available, drainage area, description of gauge, description of channel and control, method of making discharge measurements, statement concerning winter flow, method of regulation, and accuracy of estimated discharge, together with the name of the observer. Tables give the gauge height in feet and the discharge in second-feet for each day of the year; the width in feet and area in square feet of the stream section, the mean velocity in feet per second, the gauge height in feet and the discharge in second-feet during each of the dates when measurements were taken; and a third table gives the monthly discharge in second-feet and discharge in second-feet per square mile, the mean, maximum and minimum for each month being given, and finally the total run-off from the drainage area stated as depth in inches on such area.

The last-named tabulation of data, giving the maximum, minimum and mean discharge per square mile and depth of run-off, are of interest, for general comparisons, to those who have no idea of utilizing the power. Figures for the discharge in second-feet per square mile show even greater variations than in most drainage areas in this country. For instance, the monthly averages of second-feet per square mile dischage of the Grand river at Belwood, 280 square miles drainage area, show variations from .01 in January and August to 6.53 in March, the average for the year being .83. The same river at York, where the drainage area is 2,280 square miles, show a minimum monthly discharge of .16 second-feet in January and in August, with a maximum of 5.68 second-feet in March, the average for the year being 1.01. The monthly average of .01 is the lowest discharge recorded, and the largest is 6.95, for the Grand river at Brantford, where the drainage area is two thousand square miles.

The yearly averages in the northwestern Ontario district, seven stations, varied from 0.37 to 0.52; in the northern Ontario district the eight stations showed variations between 0.84 and 1.73; in the eastern Ontario district, 15 stations, the annual average discharges ranged from 0.47 to 1.41; while in the southwestern district the annual averages varied from 0.54 to 1.31. As a general thing, the higher rates were for the smaller drainage areas, but this was not always the case. In fact, the highest rate (1.73) was from an area of 2,820 square miles and the lowest (0.37) from an area of 970 square miles. But the largest area (15,570 square miles) had a discharge of 0.5 second-feet, and the smallest area (71 square miles) one of 1.31 second-feet.

The total run-off for the year, measured as depth in inches on the drainage area, in 63 per cent of the cases lay between 10 and 16 inches, in 26 per cent of the stations was less than 10 inches, and in 11 per cent exceeded 16 inches. The minimum was 5.06 inches, from a drainage area of 970 square miles, the minimum monthly average being 0.3 inch. The maximum annual rate was 18.88, from a drainage area of 430 square miles, the monthly averages varying between 0.25 inch and 4.88 inches.

A table is given showing the run-off as percentage of precipitation. These percentages vary from 19.7 to 72.0 (the run-off in the latter case being 17.78 inches), 56½ per cent lying between 30 and 50 and 85 per cent between 25 and 60. The precipitation varied from 13.89 inches to 38.81 inches, but the great majority of stations reported a rainfall of over 28 inches, and only five less than 20 inches.

## PENNSYLVANIA TOWNSHIPS RECEIVE ARREARS IN ROAD AID.

By the act of July 23, 1913, known as the "Jones Dirt Road Act," it was provided that township road taxes should no longer be payable in labor or "worked out," but in cash only; also that the state should reimburse the townships for 50 per cent of the total amount of road tax collected and certified to in a sworn statement, but not more than $20 per mile of township road.

These payments to the townships were not kept up and deficiencies accumulated, but the 1919 legislature made an appropriation of $1,142,049.38 to pay in full all the deficiencies due the townships and the certification of this bonus to the state treasurer for payment to the townships is now under way. The payments range all the way from a minimum of $11.85 to a maximum of $2,870.26.

# The WEEK'S NEWS

**West Virginia Highway Department to Furnish Local Bridge Plans—County Highway Supervision in Texas—U. S. Public Health Service Prepares for Influenza—Canadian Contractor Gets $2,500,000 Kansas City Sewer Contract—Montreal Favored in Arbitration on Aqueduct Contract—Oregon Begins Examination of Engineers—Bethlehem's City Planning Report Accepted.**

## ROADS AND PAVEMENTS

### State Commission Urges Supervision on Local Work.

Austin, Tex.—The state highway commission has issued a statement to local authorities urging adequate supervision, stating that without such supervision the most carefully made plans are valueless. The commission says:

> No standard or minimum requirement for such supervision has been accepted by the engineering profession generally or adopted by the State Highway Department. Such matters usually rest with the engineer in charge of the work. Where a commission or percentage engineering fee is paid to such engineers, the tendency is to curtail the supervision to save engineering costs. Such curtailments are usually very expensive to the character of the work.
>
> On the construction of the road the grading or earthwork is the first work done requiring supervision. Sufficient competent engineering assistants should be provided by the engineer in charge, to keep close watch on the grading work to see that objectionable material is not used in fills, that borrow pits are not taken out too deep, and to set finishing stakes on all cuts and fills of more than one foot in depth or height.
>
> On drainage structures adequate inspection is imperative, especially on concrete work. A competent and experienced inspector should be maintained with each and every concrete gang, and no concrete should be allowed to be poured in his absence. His duties should include the measurement and checking of excavations and forms, the checking of each batch of concrete as it goes into the work, in regard to quality and quantity of materials, time and consistency of mixture, and proper placing of same in the forms. An inspector may very easily save his salary for the entire job on a single drainage structure by preventing mistakes, either purposeful or otherwise, which might cause the failure of the entire structure. The same inspection is required on concrete roads as on drainage structures, only still greater care is necessary and the subgrade also requires careful attention.
>
> On all types of road surfacing careful inspection is important. An experienced and competent inspector, and not a mere checker of qualities, should at all times be kept with each gang placing surfacing. His duties should include the inspection of the subgrade for cross section and condition, as well as to insure that the terms of the carefully worded specifications are carried out.
>
> Any county or municipality which does not receive such simple and important services on their highway construction work as have been briefly outlined, is more than apt not to receive the worth of their money in results achieved. It is truly false economy to save engineering and supervision costs at the expense of inferior construction, and the most carefully laid plans and correctly drawn specifications are absolutely valueless without sufficient supervision of a high type.

### State to Furnish Highway Bridge Plans.

Charleston, W. Va.—The state road commission has decided upon a definite policy regarding bridge construction on class A roads, under which all such bridges, beginning Oct. 1, will be required to be constructed on plans to be furnished by the engineering staff of the commission. The plans will be furnished without cost to the counties. The purpose of the policy is to obtain uniformity in the plans and specifications of the bridges and in that way secure better bridges for less money than under the old plan. In connection with the announcement, the commission issued the following statement:

> The Class "A" roads, in their adoption, are first certified to by the county court, and are approved by the state road commission. These roads shall meet the requirements of the state road law, and the state road commission shall have general supervision over this system.
>
> The improvements of the Class "A" roads, by way of grades, drainage structures, paving, bridges and general alignment, will be definitely decided upon before the work on the improvements are let to contract. The Class "A" road system of the state is only considered permanently located where improvements have been made. Other portions of the Class "A" road system which have not been improved are subject to changes in the way of alignment, grade and betterment of the road-bed.
>
> In case a bridge is to be erected on the section of the Class "A" road which has not been improved, its location will be investigated very thoroughly, with a view to placing the bridge in such a position that it will be on the final location of the road. The bridge location may, in some instances, influence the location of the bridge, and the final location of the road should be very carefully considered before the final location of the bridge and the road is adopted. Any changes in this system after its adoption are referred to the state road commission for approval. Therefore, the state road commission is the only authority in position to know definitely the final location of the road.
>
> In many cases throughout the state, the existing bridges have been located without regard to final improvements in the road. This will necessitate a few of the bridges to be abandoned, and new ones built, due to the fact that the cost of building a road to suit the bridge location is almost prohibitive. In other cases, the proper location of the road will be influenced by the present bridge location, and as a result, the approaches will be bad, and the general alignment worse. This condition of affairs has come about by not having the necessary preliminary surveys and investigations of the conditions governing the road location before the bridges were built. The foundation of the bridge, in every instance, is a separate problem, and for that reason, each bridge must be fitted especially for that particular location.
>
> In order to secure uniformity in the road construction and bridge building throughout the state, the state legislature has provided that the state road commission shall prepare plans, specifications, etc., for the improvement of the Class "A" system.

"The state road commission has investigated very thoroughly what other states are doing on the subject. The states that have had the greatest amount of experience in the designing and construction of bridges and drainage structures, have with but few exceptions, come to the conclusion that the state should prepare its own plans, and receive bids on the plans so prepared. The states referred to have had the same experience with the conditions that now confront West Virginia.

"They found that the alternate plan system possesses more theoretical than practical arrangements in its favor. These states, with but few exceptions, declare themselves very vigorously in favor of a strong bridge department, and recommend that all plans be prepared by that organization, and requests for bids be on the one plan.

> The experience of the business world and the engineering profession have practically arrived at the conclusion that economy is promoted, the best results obtained, and much useless misunderstanding avoided, by the use of plans especially prepared by engineers retained by the interests having construction work done. With only a few exceptions, all large corporations, such as railroads, have their plans prepared by their own staff. The work of the Federal Government is carried on under plans prepared by its own organization.
>
> The large majority of states which have had extended experience in construction work now have all plans prepared by their own staff. Last but not least, most bridge constructors in this state favor the state preparation of plans.
>
> In order to secure competition in the construction and to standardize the work throughout the state, the commission has decided that the best interests of the state will be served by building all Class "A" bridges on plans prepared by its own staff, without cost to the counties, and contractors will not be compelled to go to the expense of having plans and specifications prepared, the cost of which is, in all cases, added to the expense of the structure.

## SEWERAGE AND SANITATION

### U. S. Health Service Wants Physicians for Influenza.

Washington, D. C.—The U. S. Public Health Service has sent out the following announcement: "The United States Public Health Service is keenly alive to the possibility of a recurrence of influenza in epidemic form during the next few months and as a precautionary measure seeks to have in its possession a list of physicians who might act in emergency in cast of such epidemic. In order to be prepared for a possible recurrence of influenza in epidemic form, the Bureau desires to have a list of physicians available for emergency epidemic duty in each state. May I ask you to secure and forward to the bureau a list of 100 physicians in your state who would be willing to serve under your direction in such an emergency? The salary would be $200 per month and per diem allowance of $4 for subsistence, together with railroad fare. The bureau would utilize these men in their own state and, in so far as possible, in their own community. Any physician who is willing to place his name on this list and have the same forwarded to Washington may do so by sending the same to his state health authorities."

### Canadian Contractor Gets Big Sewer Contract.

Kansas City, Mo.—A contract for the construction of the Turkey Creek sewer, at a cost of about $2,500,000, has been awarded to Thomas Kelly & Sons, Ltd., Winnipeg, Canada, the only bidder. The work involves among other items, 1,750 ft. of 17x18 ft. double-box reinforced concrete sewer, and two pumping stations. The principal item in the construction is a main reinforced concrete sewer approximately 1 1-8 miles long. Work will not be paid for until completed, and then with four years' special tax bills, bearing 7 per cent interest. These tax bills are practically bonds against the benefited property, which has an area of about 5,000 acres.

### Quarantine of Venereal Case Upheld by Court.

Houston, Tex.—The Court of Criminal Appeals of Texas has again held (Ex parte Brooks, 212 S. W., 956) that a person who is infected with a venereal disease may be quarantined until the disease is no longer communicable. A woman, found to have syphilis, was ordered by the health officer of Houston to be confined for treatment at the city farm. She applied for a writ of habeas corpus to secure her release, but this was denied by the court. One of the contentions made in her behalf was that she had been given numerous tests and that some showed positive results and some showed negative results. Regarding this the court said: "Nothing is thus presented for our decision. If relator is free from syphilis or gonorrhea she may present her application for writ of habeas corpus to the local courts under the authority of ex parte Hardcastle (208 S. W., 531), decided by us at this term, and if free therefrom may be discharged. The courts will understand that the health officers have no right or power to hold in quarantine citizens who do not show the presence of some of the diseases named in chapter 85 of the acts of the fourth called session of the thirty-fifth legislature." In conclusion it was stated: "We think the provision of said act that such patients should be confined for treatment until declared cured by official pronouncement is not unreasonable, unjust or arbitrary. Our attention is not called to any authorities holding this or similar acts violative of any of the provisions of our Constitution, or discriminatory, arbitrary, or unreasonable."

## WATER SUPPLY

### City Wins in Aqueduct Contract Arbitration.

Montreal, Que.—The arbitrators appointed to consider the claims between the Cook Construction Co. and the city, growing out of the contract for the enlargement of the Montreal aqueduct, and also out of the break in the water-supply conduit have made an award favoring the city. The arbitrators were Aime Geoffrion, K. C., John M. R. Fairbairn, chief engineer of the Canadian Pacific Ry., and W. F. Tye, consulting engineer, all of Montreal. In July, 1913, the city awarded to the company a contract for the enlargement of the Montreal aqueduct which amounted to about $2,323,000 and was subsequently increased by various additions to about $2,950,000. Work on this contract for the aqueduct enlargement was carried on intermittently from the autumn of 1913 to the autumn of 1917, and was attended with considerable controversy between the contractor and the city. On Dec. 26, 1917, both of the parties agreed to cancel the contract and submit their respective claims to the arbitrators for settlement. The value of the work completed at this time amounted to about 46 per cent of the original tender price. On Dec. 25, 1913, a break occurred in the water-supply conduit situated on the north side of and close to the aqueduct. As this conduit was then the sole source of supply, the city was deprived of water until temporary repairs were made and service was restored on Jan. 2, 1914. The city maintained that the break was due to the failure of the contractor to adopt the needed precautions in carrying on excavation work adjacent to the conduit, and originally claimed a total of $412,000, covering not only the amounts expended by the city at the time of the break, but also the cost of certain protection work done to safeguard the conduit, and the cost of installing a water-supply connection with the Lachine canal for emergency service. A majority of the arbitrators (Mr. Tye dissenting) held that the contractor was responsible for the break and awarded the city $82,000 damages, covering the amount expended by the city at the time of the break. The claims of the Cook Construction Co. against the city for delays, damages, extra work, etc., originally amounted to $1,922,000, plus interest, and were subsequently reduced to $1,775,000, plus $75,000 interest up to Dec. 26, 1917. The three arbitrators awarded the contractor about $432,000, plus certain interest amounting to about $17.000 up to Dec. 26, 1917. Of the $432,000, about $216,000 is awarded for damages on account of delays by the city, for which the contractor originally claimed $673,000. The city also submitted claims against the contractor, principally for non-completion of part of the work and for delays, amounting to about $269,000. On these claims the arbitrators awarded about $48,000 which, together with the award on the conduit break, makes a total of about $130,000 in favor of the city. Deducting this sum from the award of $432,000 to the contractor, leaves a net payment of about $300,000, plus certain interest charges, to be paid by the city to the contractor.

### Contractors Want Cost-Plus Basis.

Walla Walla, Wash.—Construction work on the projected reservoir for the water supply system will have to be postponed until next spring, according to a decision of the officials. It appears to be impossible to get contractors to submit bids on any but a cost-plus basis. The reservoir will have a capacity of 25,000,000 gallons.

## MISCELLANEOUS

### State Engineer Examining Board Begins Work.

Salem, Ore.—Following the provisions of the law passed by the last session of the state legislature, the Oregon State Board of Engineering Examiners has been organized, with O. Laurgaard, city engineer of Portland, as president. The other officers are F. D. Weber, electrical engineer with the Oregon Insurance and Rating Bureau, vice-president; and A. B. Carter, civil and mining engineer, secretary. The board has established headquarters in Portland for receiving applications for registration of all professional engineers practicing in the state. The bill, which became effective July 1, requires, for those properly qualified, registration without examination; or registration and examination of all professional engineers—mining, civil, mechanical, hydraulic or electrical—practicing in the state.

### Bethlehem Accepts City Planning Report.

Bethlehem, Pa. — Eight months ago the city planning commission retained Frank Koester, consulting engineer and city planning expert of New York City, to make a study of the city and surrounding territory prior to preparing a report of a comprehensive city plan. The many civic improvements made in the neighboring city of Allentown within the past few years are the results of Mr. Koester's city planning report for Allentown made in 1915, and this lead to the engagement of him by Bethlehem. Mr. Koester's report has now been accepted by the Bethlehem commission. It covers among other features interurban arterial highways, city streets, sidewalk improvements, bridges and bridge approaches, street railways, parks and playgrounds, proposed great ground plan, homes for industrial workers, promoting new industries, civic and educational centers and city sanitaton. Special attention is paid to a most extensive park and playground system, and the city has in the meantime acquired large tracts of land for this purpose.

## LEGAL NEWS

### A Summary and Notes of Recent Decision—Rulings of Interest to Municipalities

#### Payment for Local Improvements.

(Ill.) The adoption of one mode of payment for a local improvement excludes the idea of payment in any other mode.—Gray v. City of Joliet, 122 N. E. 550.

#### Demolition of Building After Fire—Liability of City for Accident.

(La.) Under ordinance authorizing commissioner of public works to notify owner of building to take it down after its destruction by fire, or to demolish it if dangerous to life, the commissioner's failure to give notice did not render city liable, where building was being demolished when accident happened, as a direct result of a codefendant's negligence.—Marshall v. Louisiana State Rice Milling Co., 81 So. 331.

#### Maintenance of Order Governmental Function — Liability for Injuries.

(Mo.) Maintenance of good order in a city park at a sham battle to celebrate the Fourth of July was a governmental function, and the city was not liable for injuries to one helping to handle a cannon, caused by presence of crowd and negligence of one who prematurely fired, on any ground of negligence in permitting dangerous nuisance to occur in a park.—Healy v. Kansas City, 211 S. W. 59.

In performing duties relating solely to its corporate character, a city is liable for injuries caused by the negligence of its agents, but, in performing duties relative to its governmental functions for the public good, it is not liable.—Id.

#### Liability of City for Injury on Street Without Sidewalk.

(Mo. App.) Where a pedestrian stumbled into a hole for an electric light pole on a street that had been open for travel for many years, although no sidewalk had been put in, the city was liable; its obligation to maintain a street in good repair arising as soon as it is devoted to the uses of the public.—McMillian v. Clinton, 210 S. W. 918.

#### Depression at Street Intersection—Liability of City.

(Minn.) Where a hole or depression in paving at street intersection resulted from the gradual decay and wearing away of wood, it must have continued for a sufficient length of time to charge a city with notice of it.—Estabrook v. City of Duluth, 172 N. W. 123.

#### Exemption from Taxation—Owner of Plant Not Actual Manufacturer.

(Md.) The owner of a manufacturing plant, who has leased it to another and derives his revenue from the rent received under the lease, not being "actually engaged" in the manufacturing business, is not entitled to a tax exemption under a city ordinance passed under Acts 1912, c. 32, and authorizing the appeal tax court, on the application of one actually engaged in the manufacture of articles of commerce, to abate municipal taxes on manufacturing machinery.—Felippe A. Broadbent Mantel Co. of Baltimore City v. City of Baltimore, 106 A. 250.

#### Right of City to Permit Construction of Platform.

(Ill.) A city ordinance, permitting cold storage company to build a permanent elevated platform over the sidewalk in front of its premises 106 feet long and 13 feet wide, compelling pedestrians to climb four steps on one end and go down an incline 15 feet long on the other for the purpose of enabling the company to load and unload goods, is not for the benefit of the public generally.—People v. Western Cold Storage Co., 123 N. E. 43.

The city council is without authority to grant a private corporation the right to construct a sidewalk 3½ feet above grade on a public street.—Id.

A platform erected by a cold storage company over a sidewalk, requiring pedestrians to walk up four steps and down a 15-foot incline, is a permanent and material obstruction to the sidewalk, constituting a purpresture inconveniencing the public, and is a nuisance.—Id.

#### Liability of City for Injuries.

(Ala.) Municipal liability for injuries to pedestrian on public street arises by necessary implication from legislative enactments on subject of municipal power and authority over streets.—Grambs v. City of Birmingham, 80 So. 874.

#### Duty of City to Maintain Parks in Safe Condition.

(Mo.) It is the duty of a city to use care to maintain its public parks, like its streets, in reasonable safe condition, a duty it performs in a proprietary or private character, so that failure to perfom it by leaving unprotected pools and chasms renders the city liable for damages.—Healy v. Kansas City, 211 S. W. 59.

#### Subscription by Municipalities for Railroad Stock—Legislation Constitutional.

(Mass.) Legislation authorizing cities and towns to subscribe for the stock of railroads is constitutional.—In re Opinion of the Justices, 122 N. E. 763.

#### Salary-Fixing Ordinance Not a Contract.

(Mich.) The fixing of salaries by the governing body of a city is a legislative act, and an ordinance enacted for that purpose is not in the nature of a contract between the city and the employes.—Schurtz v. City of Grand Rapids, 171 N. W. 463.

#### Honest Assessments Not Reviewable by Courts.

(Mich.) The discretion of assessing officers, honestly exercised on a correct theory, are not reviewable by the courts; but, if they are exercised in bad faith, fraudulently, or arbitrarily, equity can afford relief against collection.—Dewey v. City of Flint, 171 N. W. 412.

#### Suit for Validity of Assessments Before Work Is Done.

(W. Va.) Where owner of abutting property knows the city's purpose to assess his property for a paving improvement, and facts which would render assessments against him improper, he must sue to test the validity of the proceedings before the work is done; otherwise he will be deemed to have waived his rights.—City of Avis v. Allen, 99 S. E. 188.

#### Rights of Materialmen to Money Due from City to Contractor.

(Cal.) Despite Code Civ. Proc., § 1184, under Street Improvement Act, § 19, the rights of materialmen and laborers were limited to a personal recovery against the contractor with a city to do street work, and to a recovery on the bond given by the contractor's surety, and they had no rights against the moneys or bonds due from the city on completion of the work.—Adamson v. Paonessa, 179 P. 880.

#### Assessment for Cleaning Privies Under Police Power.

(N. C.) Under Laws 1917, c. 136, subc. 7, § 4, giving cities power summarily to remove or remedy anything within their limits prejudicial to public health, ordinance of a city providing for the cleaning of surface closets or privies, with an assessment on the land for the expense, for which it might be sold, was a valid exercise of the city's power to protect the public health.—Ratchford v. City of Gastonia, 99 S. E. 21.

#### Flooding of Property Due to Street Defect—Contributory Negligence.

(S. C.) A city is not liable for the flooding of a basement by reason of defects in the grade of a street, unless the injured party proves that he was not guilty of contributory negligence.—Kirkland Distributing Co. v. Seaboard Air Line Ry., 98 S. E. 843.

Where owner of a warehouse consented to construction of a grade across street by a railroad, and undertook to construct its warehouse accordingly, knowing that surface waters would collect by reason of the grade, a city, although negligent in depositing trash in street, which was banked at the defective railroad grade, was not liable by reason of the flooding of the basement of the warehouse, because the negligence of the city and contributory negligence of the owner of the warehouse were inseparable.—Id.

# NEWS OF THE SOCIETIES

**Sept. 30-Oct. 1-3.**—NEW ENGLAND WATERWORKS ASSOCIATION. Annual meeting, Albany, N. Y. Secretary, Tremont Temple, Boston, Mass.

**Oct. 1-4.**—NATIONAL SAFETY COUNCIL. Eighth annual congress, Cleveland, Ohio.

**Oct. 21-24.**—ILLUMINATING ENGINEERING SOCIETY. Annual convention, Chicago, Ill.

**Oct. 27-30.**—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, New Orleans, La. Secretary, A. W. Hedrich, 169 Massachusetts ave., Boston, Mass.

**Oct. 27-29.**—CITY MANAGERS' ASSOCIATION. Sixth annual meeting at Indianapolis, Ind. Secretary, Harrison G. Otis, Tribune Bldg., New York City.

**Nov. 12-14.**—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Springfield, Ill.

**Feb. 9-13, 1920.**—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention, Louisville, Ky. Secretary, E. L. Powers, 150 Nassau street, New York.

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### City Managers' Association.

President C. A. Bingham announces the decision of the executive committee to be that the sixth annual meeting of the City Managers' Association will be held at Indianapolis the last week in October. The dates are October 27-29.

The National Association of Commercial Organization Secretaries is to be in session at the same city at the same time. Thus the two conventions overlap by a single day and efforts will probably be made to arrange for at least one union session in order to cement more closely the cordial relations between city managers and chamber of commerce secretaries.

The question of place and date of meeting had been submitted to the members, with the result that 13 preferred Indianapolis, 11 Chicago, 6 Kansas City, 4 Louisville, and 3 St. Louis; while 19 wished the anual meeting to be in October and 17 in November; 19 preferred the same place and week as the National Association of Commercial Organization Secretaries, and 2 did not.

### The Associated General Contractors of America.

President Garber, of the Associated General Contractors of America, has sent a letter to the members urging them to use the facilities of the Contractors Service Corporation which is the official insurance and surety bond agent of the association. It is hoped that by placing a large proportion of their surety bonds and liability insurance through the Contractors Service Corporation, members would enable the corporation to exert a very large influence in fixing rates, and in obtaining proper coverage and prompt service, and at the same time would furnish financial resources for extending the work of the association.

Mackey, Mackall & Co., managers of the corporation, have actively entered into their new work. In a statement of policy, the managers say:

"We do not expect to make any exclusive arrangements with any company or companies but to maintain an absolutely independent position, placing the business with those companies and those agents who give us the greatest assistance, all things considered, in rendering to our clients the high degree of service which is expected of us and which we are determined to render."

President Garber's letter says in part:

> If the members of the Association cooperate with each other and present a solid front, the Corporation will easily become the largest and most influential compensation insurance and surety bond agent in America, and this agency will represent *you* and not any insurance company or companies.
>
> Do you realize what that means to you? It means *service*, i. e., better compensation and liability coverage and prompter and more satisfactory underwriting and execution of bonds, and ultimately, if not immediately, lower and more equitable rates; and we predict that if the members give us their support, we shall be able to improve the coverage and decrease the cost of insurance to substantially every member of the Association.
>
> It is our intention to keep a complete record of premiums received and losses paid on business placed through the Contractors' Service Corporation so that we shall *know* whether the rates that are being paid are too high or not; and we expect to represent the Association before the rating boards and to have an influential voice in the fixing of rates, not only because we shall control the largest volume of business, but because we shall have accurate information upon which to determine what rates are adequate; and we predict within a comparatively short time the rates for compensation and liability insurance and bonds will be reduced.
>
> And in addition to all this, do you realize what it will mean to you to have your Association amply financed? The Association can perform a wonderful service for its members, but only if it has sufficient funds. If the members support the Corporation, the dividends that will accrue to the Association will provide a large sum of money which can be most usefully employed in ways which we shall not attempt now to enumerate, except to say that *if fair treatment is not obtained* from the insurance companies, this fund can be used in such a way as to make it unnecessary longer to patronize the companies.
>
> The Corporation's main office will be in New York, where the best facilities of all the companies are available, and we expect to use all the companies, placing each policy or bond where the best results can be obtained, though, of course, we shall give all possible consideration to the preference of any member for any particular company. As soon as practicable we shall establish, for the convenience of the members, agencies or branch offices in all principal cities; and we assure you that we can render you a degree of service that cannot be approached by any other agency or broker whomsoever.

### American Association of Engineers.

The executive committee of the American Association of Engineers has rendered a decision that the constitution of the association does not prohibit the admission of architects, and announces that the applications of architects will be considered hereafter as in the same status as applications from engineers. Those architects who have previously applied for membership could not be accepted on account of the apparent exclusion of architects by the constitution, may now re-enter their applications for membership.

The American Association of Engineers announces the appointment of the following chairmen of national committees for the ensuing year:

Americanization.—Garrison Babcock, consulting telephone engineer, Chicago.

Education.—Professor Frederic Bass of the University of Minnesota, Minneapolis.

Ethics.—Isham Randolph, consulting engineer of Chicago.

Finance.—Glen Vivian, accounting department, Bureau of Statistics, Chicago, Milwaukee and St. Paul Ry., Chicago.

Highway.—R. C. Yeoman, chief engineer, Indiana Sand and Gravel Association, Indianapolis.

Legislation.—W. H. Whipple, chief engineer, Lime Association, Washington, D. C.

Membership.—R. W. Barnes, principal assistant engineer, Southern Pacific Ry., Portland, Oregon.

Municipal Engineering.—S. C. Hadden, editor of Municipal and County Engineering, Chicago.

Practice.—H. W. Clausen, general office manager, C. D. Osborne Company, Chicago.

Program.—L. Winship, assistant engineer, Missouri Pacific Ry. Company, St. Louis, Missouri.

Public Relations.—L. K. Sherman, president of the United States Housing Corporation, Washington, D. C.

Publications and Publicity.—W. W. Horner, chief engineer, City of St. Louis.

Qualification.—A. C. Irwin, engineer Structural Bureau, Portland Cement Association, Chicago.

Salaries of Engineers in Public Service.—A. N. Johnson, consulting highway engineer, Portland Cement Association, Chicago.

### American Society for Testing Materials.

Ten new standards have been adopted by the American Society for Testing Materials after letter-ballot vote, according to an official announcement. They include four specifications for brass, two new standard tests (for flash point of volatile paint thinners and for apparent specific gravity of fine aggregate); three methods of test procedure (including determination of softening point of bituminous materials), and recommended practice for laying sewer pipe. Two constitutional amendments voted upon at the same time were also carried.

### Missouri Valley Road Builders' Association.

At a meeting of contractors, representatives of material companies, and county, state, municipal and Federal engineers, held in Kansas City Sept. 2, it was decided to organize the Missouri Valley Road Builders' Association. The purpose of the organization is to establish closer co-operation and better understanding among contractors, engineers, material companies and highway officials in general.

The officers elected were as follows: Chairman, M. W. Watson, state highway engineer of Kansas; secretary-treasurer, M. R. Amerman, contractor, Salina, Kan., and an executive committee composed of the two above-named officers, with S. A. Fones, of the Independent Gravel Co., Joplin, Mo.; A. W. Graham, state highway engineer of Missouri, and R. E. O'Brien of the Cook & O'Brien Construction Company.

## INDUSTRIAL NEWS

### International Exposition of Municipal Equipment.

Plans are now perfected for the comprehensive and elaborate International Exposition of Municipal Equipment to be held in Grand Central Palace, New York City, beginning October 15. This enterprise, which will fill a very real need in its particular field, will be a permanent display occupying 50,000 square feet of floor space. This exposition is not to be a "show" in any sense, or a place to attract the curious. It will be an exposition for the city official, engineer, or citizen interested in municipal improvement.

There are to be displays of all sorts of modern equipment and methods used by municipalities, including departments of health, education, police, fire, parks, playgrounds, water, light, heat, power, garbage and sewage disposal, laboratory supplies, hospital and office appliances.

In the health center, for instance, there will be departments of child welfare, clinical and X-ray apparatus, first aid devices, model milk stations, etc. The educational section will contain all kinds of educational features, even to a cafeteria. It is hoped also to include, in the industrial department, a welfare section.

The names of the advisory committee are assurance that the educational and scientific phases of this exposition have been well managed by Mrs. Jeanne Carpenter, director of the exposition. The list includes Dr. Matthias Nicoll, Jr., Nicholas S. Hill, Jr., John Diven, Rudolph Hering, Samuel A. Greeley, Walter D'Arcy Ryan, Clement Driscoll, Joseph Quigley, W. P. Capes, Fred G. Simmons, Myron A. Kesner, Henry L. Kincaide. The representative number of manufacturers who have leased spaces for a year or more is indication of wide interest already aroused. This exposition, like the seven other big commercial permanent expositions in the Palace, will be operated by the Merchants & Manufacturers' Exchange of New York, which is affiliated with The Nemours Trading Corporation, a $12,000,000 corporation with branches in all the leading cities of the world, including nineteen branch offices and 3,000 foreign selling agencies.

The service to the exhibitor will include personal representation of his product, if necessary, and a lecture room where he may entertain delegations or show a film of his product. The plan for the exposition also includes a Bureau of Information which will supply data to every exhibitor, and where inquiries will be given prompt attention. Wherever a manufacturer has no foreign representative his foreign inquiries will be handled by representatives competent in that line. At present there are a number of foreign representatives in this country buying municipal equipment, and the appropriations for bonds in the last few weeks for the purchase of municipal equipment for European countries have been enormous. A Swiss delegation consisting of three divisions will begin to arrive in September, and continue on through 1920. Representatives are also coming from many other European countries. They will study our waterways and harbors, our central heat and power plants, our warehouses, packing houses and interurban utilities.

Attendance of officials and buyers is assured. Invitations are being sent to every organization and individual interested in municipal affairs both in this country and abroad.

Information regarding space may be obtained by addressing Director of the International Exposition of Municipal Equipment, Grand Central Palace, New York.

### Kentucky Rock Asphalt Company.

This company has recently engaged the services of Rodman Wiley as its chief engineer. Mr. Wiley leaves his position as state highway commissioner of Kentucky to join with this company, after becoming acquainted with its development and learning, from its use on Kentucky highways, the wonderful possibilities of the material handled by them.

**The Lakewood Engineering Company,** Cleveland, O., announces appointment of Harry W. Benkart as its representative in Buffalo, N. Y., with offices in the Ellicott Square Building. Mr. Benkart will devote his efforts to the general construction field. He has had about ten years' experience in the construction business, the greater portion of which time he spent as superintendent of the Dravo Construction Company. For the past five years he has had an agency for contractors' equipment in Buffalo, including the Lakewood line. He has now discontinued the other lines and has joined the Lakewood organization as a member of the sales department.

**The Asphalt Association,** 15 Maiden Lane, New York City, has issued a series of four brochures dealing with asphalt and its use in paving. The first booklet is entitled "The Asphalt Association" and describes the organization, states its broad objects and enumerates the many valuable services it has undertaken to render to the industry and to officials, contractors and the general public interested in highway improvement. "Asphalt, a World Old Material" is the title of the second brochure. Some very interesting ancient history of asphalt is narrated and the growth of the modern asphalt industry is briefly recorded. The general uses of asphalt are also outlined. Brochure No. 3 is on "Cost and Service of New York State Highways." It is a discussion of the actual costs of improved state highways in New York and of the service rendered, by George C. Diehl, county engineer of Erie county, N. Y. It gives interesting cost figures. The fourth brochure deals with "Saving the Investment in Macadam Pavements." It urges the conservation of the great investment in existing macadam pavements by proper asphalt surfacing and gives practical advice as to the most effective methods of rebuilding ruined macadam road surfaces. These brochures are for general distribution and may be had free of charge upon application at the office of the association.

## PERSONALS

Brown, Charles Carroll, has been appointed professor of civil engineering at Valparaiso University, Valparaiso, Ind. He will have charge of municipal, sanitary and highway engineering. During the past year he has been officially connected with the Illinois State Highway Department, from which he has obtained a year's leave of absence. To most municipal engineers and public works officials, however, he is remembered as the editor of Municipal Engineering and later as a member of the editorial staff of Municipal Journal.

Mattimore, H. S., who was connected for fifteen years with the New York State Highway Commission, nine years in charge of physical testing work, has resigned and has accepted a similar position with the Pennsylvania State Highway Commission.

Cannon, Sylvester Q., city engineer of Salt Lake City, Utah, has been relieved of the duties of superintendent of the water department, which he assumed as a war economy measure. H. K. Burton, water-supply engineer in Mr. Cannon's office, has been appointed to the position.

Brown, Le Grand, formely an engineer in Rochester, N. Y., who has been engaged in consulting work in California for a number of years, has been appointed deputy city engineer of Rochester.

Darrow, Capt. W. E., 33rd Engineers, U. S. A., has received his discharge and has returned to his position as assistant engineer, New York State Highway Department, with headquarters at Utica.

Wiggin, Thomas H., has resigned his position as designing engineer for the Board of Water Supply of the City of New York, and has gone to China, where he will remain about six months. He is to work on preliminary designs for improving the Grand Canal. Joseph Ripley is chief engineer in charge of surveys and studies for this work and John R. Freeman is consulting engineer.

Mr. Wiggin recently returned from two years of active service with the A. E. F. in France, where he was on the staff of the Chief Engineer, Line of Communication (afterward known as Director of Construction and Forestry), and had charge of the section of water-supply and sewerage. He entered the army from the Engineer Officers' Reserve Corps, in which he was captain, and received successive promotions to major and lieutenant-colonel.

# Municipal Journal & Public Works.

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*The Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.*

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## Publication Delayed by Strikes

In the September 27th issue we stated that a strike among the printers might delay the appearance of the following issues. The strike occurred on October 1st and is still on. All of the periodical and book publishers in the city are involved, and they and the employing printers have been working together and in harmony to bring about a settlement. After waiting for more than three weeks, the publishers decided on October 24th that each publisher, through his printer or with his cooperation, should make an effort to obtain the printing of his publication at the earliest possible date. Municipal Journal and Public Works is among the fortunate ones which were able to begin at once the printing of the delayed issues, and we will publish them as rapidly as possible until we have caught up.

For the appearance of this and the next two or three issues we shall have to ask that allowances be made. The printers who are taking over the work temporarily have not the type or other facilities for doing the work just as it has heretofore been done, nor has their previous experience been along just this line of work. The appearance of the pages will be somewhat different, therefore, and there will necessarily be fewer of them in each issue. The reduction in size will be secured chiefly by omission of the news matter, for as the first issue or two will be several weeks late, this will have lost much of its news value.

We trust that under the circumstances our readers will overlook any shortcomings for the time being, and will realize that we are doing our best to get to them, as soon as possible, as good a paper as adverse conditions permit.

## The Birmingham Sewage Experiments

Most engineers interested in sewage treatment have known for some time of the experiments being carried on in Manchester, and the report of Mr. Watson in this issue, giving what may be considered the official conclusions as to this method of treatment, will be of interest to all. Apparently the results obtained in Birmingham in sludge digestion were very similar to those obtained in a well-operated Imhoff tank, and a comparison between the two immediately suggests itself.

In several cases recently engineers have reported that the Imhoff tank did not appear to be feasible for the particular locations under consideration because of the great expense of excavating to the depth required by a two-story tank. In the Birmingham plant the two units of the two-story tank are placed side by side rather than being superposed, whereby the necessity for deep excavation is eliminated. Pumping the sludge, however, seemed to be necessary; but it was believed by Mr. Watson that the cost of this was more than compensated by the advantages.

Certainly it would seem as though the idea of utilizing the Birmingham system as a substitute for the Imhoff tank, where the construction features of the latter involve prohibitive expense, is well worth consideration by engineers in view of the excellent results that are reported from the latest modifications of the treatment that has been carried on in the Birmingham tests.

# THE UTILIZATION OF SEWAGE SLUDGE*

## Summary of Results and Conclusion from Experiments Conducted for Several Years at Birmingham, England — Digestion of Sludge in Separate Tanks in Two Stages—Avoidance of Odor.

By JOHN D. WATSON, M.INST.C.E.

Real progress in the treatment of sewage sludge was made in Birmingham when it was first realized that (a) sewage was inoffensive to the sense of smell until putrefactive changes began, and (b) that foul-smelling sludge ceased to offend the olfactory nerves when putrefactive changes had run their course.

To bury sludge as it leaves the sedimentation tanks is to take the most efficient method of retaining the foul odor which characterized it when it left the tank. Sludge was unearthed at Saltley recently after thirty years, which proved that burial *per se*, even if the sludge is deposited near the surface of the ground, where nitrifying organisms are most active, is not sufficient to free it from objectionable smell.

With the idea of carrying on the functions of oxidizing the liquid of sewage and the septicization of sludge simultaneously, Dr. Imhoff patented a two-story tank, which had the Travis hydrolytic tank for its prototype. The lower chamber of this tank is for fermentation, and the upper one for sedimentation. The Birmingham plan provides two separate shallow tanks, one placed alongside the other, to do the same work.

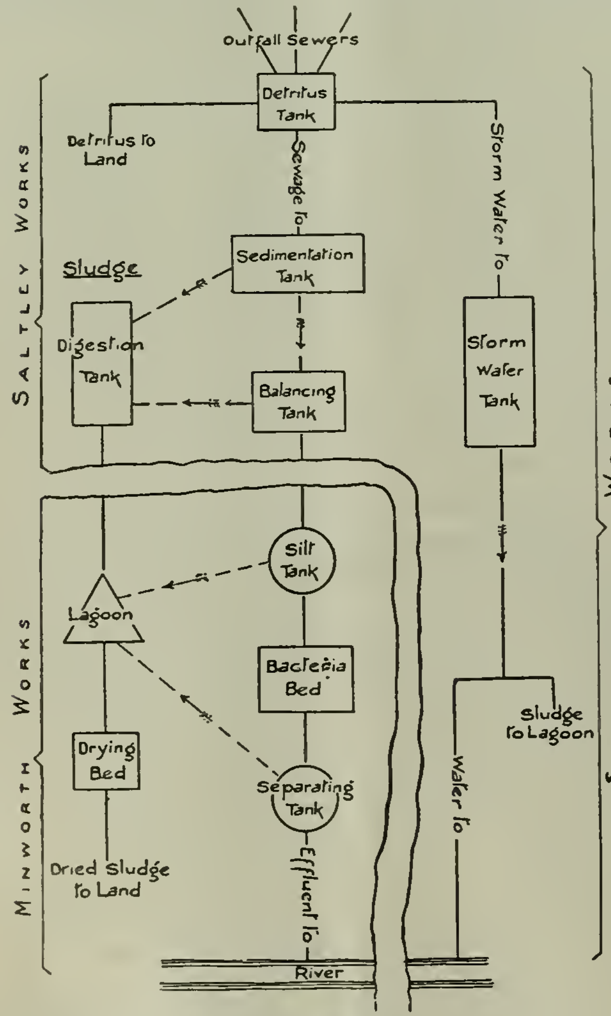


DIAGRAM ILLUSTRATING METHOD OF PURIFYING BIRMINGHAM SEWAGE.

The Minworth plant is five miles from the Saltley, the sewage flowing and the sludge being pumped from the latter to the former.

In comparing the two, it is claimed for the Birmingham method that the cost of construction is less; it is better under control; the results obtained under normal conditions equally good, and under abnormal conditions—such as obtain in time of rainfall—much better. Operating costs of the Birmingham method are greater than by the Imhoff method, but the latter is distinctly inferior when large quantities of antiseptic substances like gas tar, arrive unheralded at the outfall works. It is desirable to isolate highly antiseptic matter instead of automatically distributing it over the whole surface of the fermentation chamber, or lower story of the Imhoff tank, where it tends to inhibit the action of the anaerobic organisms upon which the success of the process depends.

There are no doubt advantages and disadvantages based upon physical and topographical circumstances pertaining to both methods which an engineer must appraise in determining the design most suited to individual cases, but the author maintains that the shallow flat tank has more to commend it than the other.

A marked feature of the Birmingham installation is the temporary character of the sludge digestion tanks, many of which are formed by a combination of excavation and embankment; the material employed to make the latter is composed chiefly of engine ashes laid on the soft material from the excavation. No lining of flagstones or inside coating of any kind is given to these improvised tanks, the sludge itself having been sufficient to seal all the interstices of the ash embankments. These tanks or lagoons are sufficient to effect the main objects in view, but they do not admit of the advantages of quick and thorough emptying and refilling associated with well-built vertical-sided tanks. Still, when cheapness of construction is essential, as, for instance, when one is experimenting, this form of construction has much to commend it.

After the inflowing sewage from a population of about 750,000 persons passes through the detritus pit, from which the heavy solids are dredged by an electrically-operated dredger, it flows through five sedimentation tanks working in parallel and subsequently through what is called a balancing tank. Each of the former has a capacity of slightly more than 1,000,000 gallons and the latter 7,000,000 gallons, together 12,500,000 gallons, or about half the dry-weather flow coming to this the main outfall of the Drainage Board's main sewerage district.

Each of the 5,000,000-gallon sedimentation tanks is cleaned every week, and the balancing tank, which is run in series with them, less frequently.

The crude sludge—92.5 per cent water—arrested in the Saltley sedimentation tanks alone amounted to 1,523,000 cubic yards during the past four years, or an average of 380,750 cubic yards per annum, the whole of which was transferred to 39 sludge digestion tanks or lagoons possessing a total capacity equal to 28,250,000 gallons.

The total dry solid matter removed from all tanks at Saltley, etc., outfalls, including Minworth tanks, in the four years 1915-1918 amounted to 110,000 tons, or 75 tons per diem, all of which was transferred to the sludge digestion lagoons.

The density of the sludge removed chiefly depends on the frequency of the cleaning operation. During 1915 these tanks were emptied once in two or three weeks, when the average water content of the sludge was 87 per cent, whereas the weekly cleaning during the four years under consideration yielded sludge with a water content of about 92.5 per cent.

---

*A paper before the forty-sixth annual general meeting of the Institute of Municipal and County Engineers, June, 1919, slightly condensed.

Theoretically, the more frequent the emptying operations the better, but economy suggests a curtailment of the operation when temperatures are low. When temperatures are high there should be frequent cleaning, and the strictest avoidance of obstructions in the sewers should be encouraged if objecionable odor is to be reduced to a minimum. This becomes even more imperative as the area of a drainage district increases.

It has been shown that with care the putrefaction of the liquid can be prevented, but the successful digestion of the sludge has proved to be a more difficult problem; still, with accumulated experience and the expansion of the tank area the operations at Birmingham have been conducted with greater ease, economy and success as time went on.

The digestion tanks used at first consisted of an existing installation of 20 tanks, 16 of them with an aggregate capacity of 4,539,500 gallons and 4 of them with an aggregate capacity of 2,723,680 gallons, all so thoroughly well built and equipped with emptying arrangements that they are easily the best of the installation of 39 tanks.

For the first two years the digestion operations were conducted in two stages in this installation of 20 tanks. The 16 tanks were used for primary digestion and the 4 larger ones for the secondary digestion. Two stages were adopted, as it was found in the very early days that vigorous fermentation was the better maintained thereby and tank space was saved to such an extent by pumping from one tank to another that the second pumping was economical when compared with the prospect of an increased capacity; it was soon discovered also that inoculating raw sludge with ripe sludge thus obtained from the secondary tanks had an excellent effect upon the "speeding-up" process. Further, temperature was too obviously a beneficial factor in the success of the process to be ignored.

The following mode of operation was adopted at the beginning of 1912 and has been continued ever since. In cold weather the sludge is transferred from the particular sedimentation tank whose turn it is to be cleaned out into the selected digestion tanks (generally five or six in number) by the main set of pumps; simultaneously some of the ripest of the available sludge is pumped by a small pump into the same delivery main in the proportion of 1 to 4, thus inoculating at the earliest possible moment the fresh sludge with the fermentative organisms; in addition steam from one of the Lancashire boilers is injected into the delivery main to produce temperature conditions most favorable to fermentation.

In moderately warm weather steam injection is abandoned, and during the heat of summer neither inoculation nor steam injection are resorted to. The biological factor governing the digestion process must necessarily be somewhat complicated, and it is only by the most careful observation of the conditions which bring about the right balance of living organisms that success can be achieved.

The following tables of analyses supplied by F. R. O'Shaughnessy, consulting chemist, indicate two different sets of conditions, Table A where the fermenting mass was very offensive, and Table B where the vigorous fermenting mass was quite inoffensive.

TABLE A.

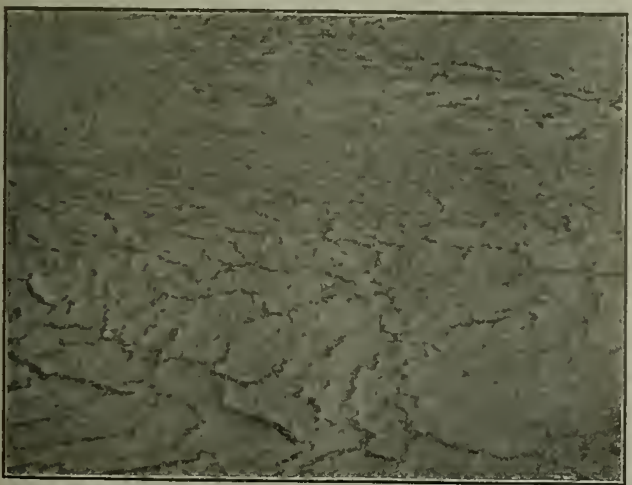
| | | Total Counts. Organisms per c.c. |
|---|---|---|
| Gelatin-Peptone-Bouillon at 20°C....... | Mean | 24,000 |
| Agar-Peptone-Bouillon at 37° C........ | " | 130,000,000 |
| Coli group .............................. | | 7,000 |
| Proteus group (including **Enteritidis sporogenes**) ......................... | | 100,000 |
| Denitrifiers ............................ | | 500 |
| Fat-splitting organisms.................. | | 10,000 |
| Cellulose ............................... | | 100,000 |

TABLE B.

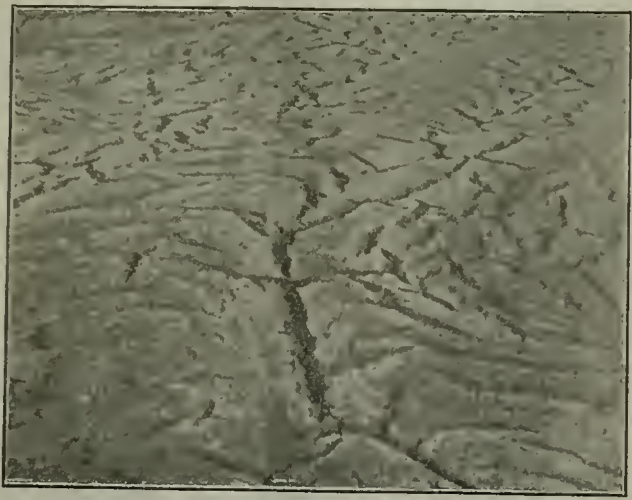
| | Total Counts. | |
|---|---|---|
| | Aërobic. per c.c. | Anaërobic. per c.c. |
| G.P.B. at 20° C.................. | 52,000,000 | 15,700,000 |
| A.P.B. at 37° C.................. | 5,000,000 | 3,000,000 |
| Coli group ...................... | 60,000 | |
| Proteus group ................. | 100,000 at least | |
| Denitrifiers ..................... | 100,000 " | |
| Fat-splitting organisms.......... | 100,000 " | |
| Cellulose organisms............. | 50,000 | |

Having obtained the right bacterial balance, so to speak, the aim of the management is to maintain it. What looks like an inexhaustible volume of sludge which constantly varies in character (about 1,000 tons per day) is drawn to a locality literally surrounded with dwelling-houses, factories, etc., and formerly gave rise to loud and serious complaints. Now, this large mass of foul material is treated on the same site without any offence whatever.

Variation in the character of sludge is only to be looked for in a great manufacturing district where there are no restrictions on the discharge of trade waste into sewers; but these are sometimes very serious in their consequences, as when large discharges of tarry products from coal, water, or producer gas-plants suddenly appear.



SLUDGE AFTER THREE DAYS IN THE DRYING BED.



SLUDGE AFTER THIRTEEN DAYS IN THE DRYING BED.

The saving factor in the situation is the system of separate sedimentation and separate sludge-digestion tanks, so that whether it is a sudden increase of volume due to rainfall or an overpowering mixture of antiseptics, the large number of sludge tanks in all states of fermentation renders the scheme at once elastic and manageable. The capacity of the whole of the sludge-digestion apparatus is equal to 165,000 cubic yards or 28,000,000 gallons, which, with the present demand, means a time retention of between four and five months.

The average analysis of the sludge for the four years 1915-1918 is as follows:

| | |
|---|---|
| Water | 92.5 per cent |
| Dry solid matter | 7.5 “ |
| Specific gravity of wet sludge (estimated) | 1.0256 “ |
| Specific gravity of dry solid matter | 1.50 “ |

and the average analysis of the dry solid matter is as follows:

| | |
|---|---|
| Matter volatile at red heat | 58.5 per cent |
| Matter non-volatile | 41.5 “ |
| Total nitrogen | 2.71 “ |

The fatty matter in the crude sludge varies greatly, the actual limits for the figures in the analyses made being from 16.85 per cent to 31.00 per cent, with an average of 22.20 per cent. These figures represent a total ether extract, but it is probable that about 2 per cent of this ether extract is resinous matter, and the real fatty matter will be represented by an average figure of about 20 per cent.

The improvised lagoons at Minworth, which form part of the installation of 39 tanks, were formed by surplus spoil from the bacteria bed site and dry sludge from the drying bed area, and they perform at least three functions:

1. They give time for the completion of the fermentation process.

2. They permit, with almost no detriment to the installation, the admission of humus from the bacteria beds, flushings from tanks, and flushings from distributing pipes.

3. They act as decanters of supernatant water.

The first is of course the primary purpose of the lagoon.

Imhoff found that he required his fermentation chambers to be large enough to contain from three to six months' storage of sludge. The author finds that the average requirement for the past four years has been equal to a storage of four months.

It has been proved abundantly that sludge dries more readily when the digestive process has been carried to exhaustion before it is pumped to the drying area; hence the economy of ample tankage.

The second is a most important function. The so-called "humus" excreted from a bacteria bed, like the sludge discharged from an activated sludge plant, is a valuable fertilizer, but so far has not been utilized because of its "emulsive" character and the difficulty and expense of dewatering.

When nearly 1,000 tons of it have to be got rid of each day the importance of dewatering cannot be over-estimated. To pump it back to the beginning of the process (the detritus pit) is a practicable solution in most cases, but not when it has to be forced through five miles of pumping main. Mixing it with the sewage as it entered the silt tanks just before spraying it over the bacteria beds was tried, but was found impracticable owing to the fibrous growths which were introduced into the distributors. Allotting a lagoon to itself with the view of trying to separate solids from liquid by mechanical action alone was not a success, and of all the various proportions of humus and ripe sludge mixtures made with the view of encouraging separation the best result was obtained where the smallest quantity of the former was mixed with the largest proportion of the latter. This is understandable when one remembers that the "humus" contains 5 to 6 per cent of nitrogen and the oxidized sewage effluent conveying it has in its composition a sufficient quantity of nitrates to arrest putrefactive tendencies.

How long this humus emulsion will remain a jelly it is difficult to say, but there are samples on the works which still retain that jelly-like character after exposure to the atmosphere for six years.

The third is not the least important function of this lagoon. Water rises to the surface when fermentation is exhausted and frequently when it is quiescent, when it may be decanted direct to the filter-bed. When one remembers that by reducing a 90 per cent to an 80 per cent sludge one gets rid of one-half its water content, the importance of decanting as much liquid as possible is evident. It has also been proved that additional advantage is gained by providing deep lagoons, thus supporting A. J. Martin's theory that the deeper the tank the denser the sludge obtained; at the same time the benefits in this respect must be measured by the degree of emulsification obtaining.

The rotted sludge or residuum of the fermentation process is pumped direct to the drying-beds which are in the immediate vicinity. They consist of plots of engine ashes 150 feet square and have a total area of 54 acres. All the plots are under-drained with 4-inch agricultural tile-pipes in herringbone fashion toward a main leader which conveys the drainage to a well, whence it is pumped, with water decanted from the lagoons, to a percolation filter made for the purpose.

Each drying-bed is formed by earthen banks about 2 feet high. The area is provided with a system of permanent 2-feet gauge tramways—laid to suit loco haulage, both steam and electric battery locos—and provided with conveniently placed turnouts and crossings to allow temporary rails to be laid through the beds for the collection of dried sludge.

The time required for drying varies with the weather, but in dry weather it quickly cracks and admits air. Figure 2 shows the appearance of the sludge three days and Figure 3 thirteen days after it has been deposited. When it has become sufficiently dry to be lifted in lumps it should be conveyed to the tip, as it is troublesome to the workmen when it gets into the dry-as-dust state; indeed, eye protectors have had to be provided in such cases. The embankments which are being formed of the dry sludge are about 15 feet in height. When the lumps are tipped over the embankments the drying is completed, and the estimations for calorific value dried at 212° F. give an average of 4,500 B.T.U., or something similar to the calorific value of ordinary house and shop refuse as burnt in a destructor.

It should be clearly understood that this process of sludge treatment is put forward as a complete process in itself, just as the Imhoff tank process was put forward by the German engineer, but without in this case any suggestion that the effluent from the sedimentation tank could be discharged into a stream. It effectually converts an exceedingly offensive colloidal mass of sewage into a dry substance, which might be kept in one's office for years without giving off more odor than would garden soil in similar circumstances. This conversion is accomplished without nuisance at any stage, and judging by pre-war costs the expense is similar to that incurred by London and Manchester. The figures for cost given by the Royal Commission on Sewage Disposal are as follows:

| | Pence per ton (90 per cent water) |
|---|---|
| Sea disposal | 4.1 to 6.9 |
| Trenching in soil | 4.0 to 7.0 |
| Pressing (for large towns) | 7.7 to 12.6 |
| Pressing and burning | 18.0 |

Comparing sludge digestion at Birmingham with these figures, and assuming a wet sludge containing 90 per cent water, it is approximately 5 pence per ton.

Cost figures are bound to vary, and in comparing sludge costs care should be taken to see that the percentage of water in the sludges coincides. Another statement showed the cost to be 6.3 pence per ton of sludge (86.6 per cent water) made up as follows:

(1) Cost of tankage, digestion and pumping to drying beds:

| | £ | s. | d. |
|---|---|---|---|
| Wages | 1,622 | 10 | 0 |
| Coal | 710 | 5 | 0 |
| Stores, etc | 90 | 9 | 0 |
| Repairs, etc. | 22 | 10 | 0 |
| Water charges | 75 | 5 | 0 |
| | £2,520 | 19 | 0 |

The volume of sludge dealt with was 260,000 cubic yards. Approximate cost per cubic yard of wet sludge, 2.25 pence.

(2) Cost of drying sludge, lifting and carrying to tip:

| | |
|---|---|
| 28,816 cubic yards of dry sludge | £990 17 7 |
| Cost of cubic yard of dry sludge | 8.3 pence |
| Cost of cubic yard of wet sludge | 2.5 pence |

By adding (1) and (2), wet sludge 86.6 per cent water equals 4.7 pence per cubic yard, or 6.3 pence per ton.

That the scheme as illustrated at Birmingham is as perfect as it might be made the author does not claim. It began as an experiment, and has been extended from time to time always as an experiment. The great tanks and lagoons, with a total capacity of 28,000,000 gallons, have been built in a temporary manner out of revenue as necessity has arisen, and the design or lay-out (apart from the biological side), if design it may be called, is obviously an improvization to meet current requirements and to obtain knowledge, rather than a consistent ideal based on some well-tested prototype. Indeed, our calculations were so far out of truth originally that at one time we hoped that by an intensive fermentation at Saltley the 20 brick-built tanks, which have a capacity of 7,000,000 gallons, would suffice for treatment of all the sludge arriving there.

The adoption of the scheme which has been described was due to the impossibility of septicizing sewage and sludge together without nuisance. It has accomplished what it essayed to do, thanks chiefly to the consistent work of our chemist and superintendent of works, but its final success is dependent upon the profitable utilization of the nitrogen, which up till now has been lost sight of in the predominating desire to get rid of sludge with a minimum of nuisance.

### PROFITABLE UTILIZATION.

With the object of recovering from the dry sludge nitrogen and other products of distillation, a boatload of it has been sent to the Saltley gas works each week for some time. Absolutely trustworthy results will not be available until more producers are installed there, but the gas works engineer, Mr. Chaney, says that he is willing to give 3s. 6d per ton for it, delivered in boat at the Saltley gas works.

Just before the war began the Drainage Board entered into a contract with the Anglo-Continental Fertilizers Syndicate, Ltd., by which that company agreed to treat about one-fifth of the Birmingham sludge with the view of recovering from it both fats and fertilizers, but chiefly fertilizers. The outbreak of war upset the project for the time being, the Treasury absolutely forbidding the expenditure of money on work of this kind, with the immediate result of encouraging the gas works experiments which have turned out as well, and now that the war is over the company's plans are to be put into the hands of builders whose initial work is essential before the company can begin to fulfill its agreement.

The scheme put forward by the company is one which the author hopes to deal with in a subsequent communication, but briefly it is as follows: The sludge is warmed to a temperature of about 90° F., when a small amount of yeast (from 0.5 to 1 per cent) is added and the mixture allowed to remain in suitable tanks for a period of twenty-four hours, provision being made to keep the mixture at the optimum temperature of 90° F. As the result, certain important changes take place in the character of the sludge, the particles coagulate into a compact mass which separate from the water and rise to the surface, being buoyed up by the gases evolved from the ferment. The water is run off through perforated pipes, which, while allowing the liquid to pass, holds back the thick sludge and enables the separation of the water from the sludge to be effected easily and quickly, and with a minimum of labor.

Some changes other than physical are brought about by the process and the colloids are affected to some extent, with the result that the sludge is improved for subsequent treatment.

Fermentation reduces the sludge, say, from 90 per cent water content—which is the average of ordinary sludges —to 80 per cent, equal to the reduction of one-half the water content, thus reducing the cost of treatment. The operation being a static one, the cost of working is small.

The heat used for warming the sludge is obtained from the drying process, and may be either furnace gases, or hot air and vapor from the dryers, which would be otherwise wasted.

The further treatment of the sludge depends to some extent on local conditions. Moisture may be gotten rid of by treatment in dryers heated by means of hot air, by direct heat, or in steam-jacketed drying-pans. It can also be reduced to about 50 per cent by an intermediate process of pressing in ordinary sludge presses, and the cake, after being broken into small pieces, finally dried to a moisture content of from 10 to 15 per cent.

The product is reduced to a fine powder for easy application to the land; it is then in a suitable condition for further treatment if grease is present in sufficient quantity to justify its recovery.

This process is too complicated to be disposed of in a few sentences, and the author proposes to give the Institution a detailed account of it when the works are erected and in full operation.

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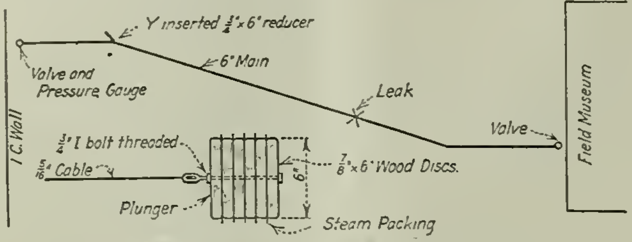
## LOCATING WATER MAIN LEAK.

A leak in a 6-in. water main buried under a 30-ft. fill in front of the Field Museum in Chicago was located by a novel method, which is described in "Successful Methods" as follows:

The water was cut off at the valve near the Illinois Central right of way retaining well shown in the figure. The pipe was cut and a Y laid on its back was inserted, through which the diaphragm plunger shown in the figure was passed. This plunger was made of six 1-in. discs with rubber steam packing between and a threaded eye bolt run through the center to which a 5-16-in. wire cable was attached. The end of this cable was first threaded through a ¾ by 6 in. reducing bushing with the ¾-in.

opening packed to make a water tight joint around the cable, after which the reducer was placed in the open end of the Y. A pressure gauge was put in at the valve near the Illinois Central wall.



METHOD OF LOCATING LEAK.

Water was turned on, the valve at the building closed, and about 6-lb. pressure obtained in the pipe by opening slightly the valve at the Illinois Central wall. The plunger moved along the inside of the main until the leak was reached, when the pressure disappeared and the plunger stopped moving. This located the leak, the distance from the Y being determined simply by measuring the cable as it was paid out. The plunger stuck only once or twice, necesistating an increase of the pressure to 18 lb. until it started again.

The method was devised by Howard White, of Graham, Anderson, Probst & White, architects, of Chicago, and was executed by R. J. Powers, the plumbing contractor.

## ADVANTAGES AND LIMITATIONS OF COMMISSION GOVERNMENT.

A bulletin of the Bureau of Municipal Research, of Toronto, Ontario, has just been issued discussing the subject of Commission Government, briefly "in response to the requests of various citizens"; the purpose being to describe, in a series of bulletins, the forms of city government in vogue in Canada and the United States.

The bulletin begins with a brief sketch of the history of Commission Government and a description of what it is, both of which are probably well known to the readers of Municipal Journal & Public Works. Of considerable interest are the opinions given as to the advantages and limitatione of this form of government.

The advantages are stated to be the following:

"1. It simplifies the structure of city government, leads to better financial control, and enables the city to conduct its business more promptly.

"2. By placing each commissioner in charge of a definite department and making him responsible to the people for its proper and intelligent management, it gives conspicuous responsibiltiy and hence accountability of all elected officials to the people.

"3. The Initiative, Referendum and Recall permit actual citizen participation in civic affairs.

"4. It stipulates, for a time at least, citizen interest in civic government."

The limitations are said to be:

"1. The form is not conducive to harmony in the governing body. As each commissioner represents a department, and the five make up an executive body for th ewhole, commissioners quite frequently resent interference by other commissioners with their respective departments. There is the tendency to divide the city into five little governments.

"2. Election is a poor method of obtaining trained and competent officials. The tendency is to elect men who are experts in getting elected and not specialists in administration.

"3. It provides nothing more than an incentive to better service. It gives the officials no new technique and no new method. With some noticeable exceptions, cities show little adminstrative progress under it.

"4. It practically abolishes the office of mayor, and does not provide an apex for the pyramid of local administration. It does not go to the logical conclusion in concentrating responsibility.

"5. A commissioner may just be in process of becoming efficient as an administrative head when he fails of re-election. This unnecessarilyy shortens the tenure of office of heads of departments, who should be permanent as long as good service is given.

"6. Department heads cannot give all their attention to their departments, but must invest considerable time and energy on 'mending their fences' foi re-election.

"7. Departmbent heads are apt to make appointments coming under their jurisdiction with a view to a possible influence on their own chances of re-election.

"In almost all cases where Commission Government has been adopted the people, under the impression that they were parting with powers formerly possessed, inserted in their government the Initiative, Referendum and Recall. These provide for citizen participation in the government at any time upon petition of a percentage of the voters:

"*Initiative*—A percentage of the voters may ask the commissioners to pass an act. The latter must then either pass such act or submit it to a general or special election of the citizens.

"*Referendum*—On demand of a percentage of voters the commission are compelled to put to a vote of the people a law they have passed before the same can be enforced.

"*Recall*—A percentage of the voters may compel the electors to vote on whether or not a member of the commission shall be recalled.

## FIRE ALARM AND POLICE CONTROL

The first fire-alarm telegraph system was installed in Boston in 1852. In 1917 there were 1285 such systems, and also 383 police-patrol systems and 45 combined fire-alarm and police-patrol. This does not include adaptation of local telephone service to such uses, but only those systems in which the boxes and wires are used exclusively of sending signals to a central office. These and the remaining figures in this article are found in a report for 1917 of the U. S. Census Bureau.

The 1713 systems above referred to represent 1349 cities and towns; of which 921 reported only fire-alarm systems, 19 only police patrol, 364 reported both, and 45 combined and interchangeable systems.

In fire-alarm the middle Atlantic states lead with 336 systems, New England had 309, the East North Central had 248, while the smallest number was reported by the West South Central—37. In numbers of police-patrol systems, the geographical divisions are arranged in the same order.

During the ten years 1907 to 1917 the number of systems increased from 1157 to 1713. During this period the miles of overhead wire used increased from 42,796 to 55,937, while the miles in underground subways or conduits increased from 28,016 to 51,721; or 30.7% and 84.6% respectively. The number of boxes or signaling stations increased from 62,504 to 94,853, being 0.88 per mile of wire in each case.

In numbers of fire-alarm systems the leading states rank as follows: Massachusetts, 140; Pennsylvania, 128; New York, 121; New Jersey, 87; California, 76; Michigan, 63; Ohio, 55.

In numbers of police-patrol systems the states rank as follows: Massachusetts, 54; New York, 38; New Jersey, 37; Pennsylvania, 34; Ohio, 30; California, 17; Illinois, 16; Connecticut, 15; Michigan, 14; Indiana, 13; Wisconsin, 11; all others under 10.

In numbers of boxes or signaling stations, New York leads with 12,202; Massachusets had 10,783; Pennsylvania, 9,754; Ohio, 6,573; Illinois, 6,045; New Jersey, 5,175; California, 4,943; Michigan, 4,771; Wisconsin, 2,793; Connecticut, 2,682; Indiana, 2,707; Missouri, 2,480. All others were under 2,000.

Perhaps the most important improvement in recent years has been the placing of the wires underground. In 1917, 97.2 per cent. of the underground mileage was in cities of 30,000 inhabitants or more. Detroit led with 9,752 miles of single wire underground; Chicago had 5,192; New York, 4,976; Cleveland, 2,420; Boston, 2,132; Milwaukee, 1,710; Syracuse, 1,476; Philadelphia, 1,299; Pittsburgh, 1,260; Buffalo, 1,065; Washington, 1,033. No other cities had over 1,000 miles.

In the District of Columbia, 89.2 per cent. of the total mileage of wires was underground; in Michigan, 69.5 per cent; in Nebraska, 69.2; in Maryland, 68.1; in Wisconsin, 64.8; in Illinois, 59.5; in New York, 56.7; in Minnesota, 53.2; in Ohio, 52.0. In all others the percentage was under 50.

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# NEW ENGLAND WATER WORKS ASSOCIATION CONVENTION

## THE THIRTY-EIGHTH ANNUAL CONVENTION AT ALBANY.

### Condensed Report of the Several Sessions—Reports of Committees, Papers Read and Discussions—Reservoirs, Standpipes, Mains, Meters, Engines and Other Features Considered.

This convention was held at the Ten Eyck Hotel in Albany, N. Y., on September 30th to October 3rd inclusive. There were 291 registered attendants, of whom 129 were active members. In addition to the opening business session on Tuesday morning, there were nine sessions for the reading and discussion of papers and a tenth session at which moving pictures were shown illustrating manufacturing of steel pipe and others for entertainment purposes only. Two papers were assigned for each session, and the program was carried out with only two or three changes, one being a transposition of papers between Tuesday afternoon and Wednesday evening and another being the omission of the last paper because the author had been and still was on guard duty in Boston, for which, however, another paper was substituted. There was abundance of time for discussion—in fact, it would seem as though the entire program could have been put through in two or two and a half days instead of the four that were only partly occupied, some of the sessions lasting only an hour and a half or two hours, while an average of about three hours each was available.

The meetings were quite well attended, with the exception of the last evening, when only fifteen or twenty were present.

#### TUESDAY'S SESSIONS

At the opening session, following the address of welcome by the mayor and others in behalf of the city, President Killam delivered the annual address, in which he laid particular stress upon the need that careful watch be kept upon legislation affecting public health, and suggested that the society have a paid assistant secretary to handle its growing business, and that it establish a budget system; also that a committee be appointed to consider changes that should be made in the association's constitution and by-laws.

Reports of the several cities were then called for, but practically all of those submitted were little more than progress reports. The Committee on Awards announced that the Dexter Brackett memorial medal was awarded to D. A. Heffernan, superintendent of the Milton, Mass., water works, for his paper entitled "Practical Methods of Detecting Leaks in Underground Pipes."

On Tuesday evening the president's recommendation that the society adopt the budget system was endorsed by a vote that he appoint a committee of three to formulate and report upon such system, the report to be submitted at the September meeting of the society.

Langdon Pearse, in a communication, suggested that the association consider the question of the creation of a national department of public works, a bill for which is now pending in Congress, and the motion was adopted that a committee of three be appointed by the president to report to the association recommendations regarding action to be taken by the society.

In the afternoon session, Theodore Horton, chief engineer of the New York State Department of Health, described the work being done by that department in the supervision of public water supplies, devoting special attention to the results obtained by such supervision. The engineering division of the department was established in 1906, and in 1917 the typhoid rate began a rapid and uniform drop from its previous average of twenty per 100,000 until it reached six in 1916, with very slight drops in 1917 and 1918. While all of this decrease is not claimed by the department as due to its water-supply work, the records indicate that it can claim a very large part of the credit as resulting from its investigations of water supplies and the giving of advice and securing the adoption of such advice. In 1919, out of 530 water supplies, 130 are treated by filtration or chlorine or both. The population that is furnished purified water is about ten times as great in 1919 as it was in 1907.

Professor William P. Mason gave some suggestions concerning operating swimming pools, using the Rensselaer Polytechnic Institute pool as his chief illustration. He stated that few pools at the present time were operated on the draw and fill principle, but most used the water continuously, purifying it by filtration or other means. At the R. P. I. the water is changed only once a year, being pumped through a filter plant and chlorinated to remove impurities. Soda ash is used to remedy alkalinity. The aim is to use one grain of alum per gallon of water and about six-tenths part per million of hypochlorite. The hypochlorite is applied directly to the tank and not to the small amount that passes continuously through the filtration plant. The water is kept at a temperature of 76 degrees, which is lowered to about 72 degrees on certain occasions such as athletic meets. Color and turbidity he considered dangerous, since the bottom of the pool should be visible at all times, one instance being cited in which a bather lay drowned at the bottom of a pool of turbid water for some time before his absence was noticed. For removing sediment, he recommended drawing this off at the bottom rather than at the sides of the tank. In the R. P. I. tank it is swept onto a grid in the bottom of the tank and drawn off through this. A new device very much like a suction sweeper has been used for removing the sediment in Boston and some other cities. The University of Illinois is using the violet ray for purifying water and New York City has experimented with ozone. Both are very attractive from a theoretical point of view but he considers that their upkeep is quite expensive, chiefly because of the fragile nature of the apparatus.

In the evening J. Waldo Smith, chief engineer of the New York Board of Water Supply, described the Schoharie development of that city's Catskill supply. This is to add to the present supply 250 million gallons daily. The principal features are a reservoir formed by a dam at Gilboa and a tunnel known as the Shandaken tunnel for bringing this water to the existing Ashokan reservoir. The tunnel has been contracted for by the Degnon Contracting Company at $12,138,000 and the dam by the Hugh Nawn Contracting Company for $6,819,000. The tunnel will be about eighteen miles long and will be reached by shafts at the various points where it passes under the valleys between the several mountains. The shafts are fourteen feet in diameter and are lined with concrete and will be left open at the completion of the work. The deepest shaft is 630 feet. All shafts have now been completed except that at the intake.

The next paper described the 10,000,000-gallon covered reservoir of the Dayton water works, which was built in 1917-1918, the most interesting feature of which was the construction of the roof with flat concrete slabs rather than with groined arches, as is customary. Owing to war conditions, only local bidders bid on the contract and none of these was familiar with groined arch construction, and they were therefore willing to submit lower bids on slab construction. Consequently, although the plans had originally called for the groined arches, new plans were prepared and bids invited on the flat slab construction. This type is believed to have a somewhat smaller factor of safety and a shorter life, but the considerable saving in cost was considered to justify adopting it. The paper gave the specifications and general requirements for the construction, a description of the plan employed and of the forms used, described the progress of the work and finally gave the itemized cost. Messrs. Metcalf and Barnes, the authors, presented lantern slides showing the various features of the works.

### WEDNESDAY'S SESSIONS

On Wednesday morning Charles W. Sherman presented a paper entitled "Protecting Iron and Steel Standpipes from Corrosin." This paper was based upon a questionnaire sent out by Metcalf & Eddy to which about 150 replies had been received, these giving information concerning the size and age of standpipes in the several cities, when they had been painted, the preparation made for the painting, kind of paint used, cost, and condition of the standpipe at the time of the report. Mr. Sherman was not able to form any positive conclusions from these replies nor to summarize them because of their great variety. Based partly upon these replies and partly upon the carefully studied experiences of the Boston metropolitan district and some others, he has reached the conclusion that red lead properly applied to a perfectly clean surface gives perhaps the best result of any materials that have been tried. This applies to the inside of the standpipe. For the outside there seemed to be no reason for thinking that paints which proved satisfactory on steel bridges would not prove equally so on standpipes. One question brought out the answer that iron pipe could probably go unpainted for a long time with little deterioration, while this would not be true of steel pipe, and no one dissented from this statement.

In the discussion it was stated that New Rochelle, N.Y., had found red lead very successful, the speaker stating that for painting the outside of standpipes he employed ordinary house painters and found that he got as good results as by the use of professional bridge painters at about one-third the cost. Woonsocket reported having one wrought-iron tank and two steel tanks and the latter were much more pitted than the former. Boston uses "Dutch Boy" red lead mixed with litharge (although the manufacturers do not approve of such mixture). The city furnishes the material but has the work of painting done by contract. Of the labor employed in painting, three-fourths is employed on cleaning the inside of the tank and one-fourth in painting it. One tank was painted inside with gilsonite, but the ice, rising and falling with the fluctuation of the weather had scraped all of this off. One member inquired whether air blast had been used for painting tanks and was informed that Fall River had painted a tank in this way in 1912 but not since, although the reason was not stated. This paper will be published in Municipal Journal and Public Works.

Following this, Bertram Brewer, assistant engineer to the Massachusetts State Department of Health, read a paper entitled "Public Control over New Streets, in Relation to Extension of Water Mains." He emphasized the importance of having streets graded and their lines established before water mains were put in, as otherwise it is probable that mains would have to be changed in vertical or horizontal positions later on. He pointed out the great aid which water works superintendents could render in assisting city planning commissions to secure the carrying out of their street plans, by refusing to lay mains in streets which had not been approved by the city planning boards or commissions. Following a discussion of Mr. Brewer's paper, Mr. Saville moved that a committee be appointed to consider the matter of assessing for water works extensions or otherwise collecting cost of the same, and the relation between such extensions and the street layout. Owing to the necessity for adjourning at once, the motion was laid on the table and was taken up on Thursday morning and passed.

The Wednesday morning session had been held in the dining room of the steamer Rensselaer, in which the entire convention spent the morning and afternoon of Wednesday. In the afternoon the session was held on one of the upper decks of the same steamer, Col. F. F. Longley describing the work done in providing water for the American Expeditionary Forces. This was an exceedingly interesting description by the officer in charge. As such service had never before been entrusted to a separate branch, Col. Longley had first to develop an organization from the very beginning. A special water-supply regiment, the 26th Engineers, was organized and recruited. It was considered essential that the control of water-supply work should be geographically constant, and not be in the control of mobile tactical units. The water-supply service was made responsible for the amount and character of the water delivered at the water points, from which points the tactical units obtained their supplies by tank trucks or carts, and beyond these points the medical department was responsible for the quality of the water. The obtaining and purifying of the water and transporting it to the water points involved the use of water-tank trains, purification plants mounted on motor trucks, movable repair shops and the standardizing of pumps, gasoline engines, pipe etc. By these facilities used in large quantities the service was able to perform feats which the French engineers announced were impossible, among these the supplying of the army with water while it was wiping out the St. Mihiel salient, working across a waterless area. At the time of the armistice, plans had been practically completed for doubling the water-supply forces. An illustration of the enormous amounts of materials required is indicated by the fact that just prior to the signing of the armistice an order had been sent to the United States for 4-inch pipe to be supplied at the rate of ninety miles each month.

The evening session was held at the Hotel and H. S. R. McCurdy, division engineer of the Miami Conservancy District, described the hydraulic fill dams being constructed by the district, first showing by means of lantern slides the previously unequalled damage done by the Dayton flood. Work is progressing rapidly on the construction of these dams. By means of slides the general features of the sluice ways and spillways were shown, the means employed for preventing damaging results from the great velocity of the water flowing through the dam at the time of a flood, and several of the other more interesting features. It is calculated that the dams will not be overtopped with water until there is twice as much run-off as flowed off from the respective drainage areas at the time of the Dayton flood.

The paper describing the operation of the drifting-sand filters at Toronto, which had been postponed from Tuesday afternoon, was presented by Norman J. Howard, bacteriologist in charge of the plant, and illustrated by lantern slides. This type of filter was described by Municipal Journal in the issue of November 16, 1918. Mr. Howard presented tables showing the details of operation and the results obtained as to turbidity, bacteria and B. Coli. The average reduction in bacteria was given as 88.4 per cent, and of B. Coli, 96.4 per cent. The chlorinated water showed an average bacterial count of 1.72 per c.c. and only two samples out of 1,900 showed the presence of B. Coli in 1 c.c. He concludes from the experience so far obtained that during the year the composition of the water appears to undergo two distinct changes which make the treatment difficult, that more coagulant is necessary in summer than in winter, and that in using the drifting-sand filter during 1918, satisfactory purification was obtained with the average dose of one grain of alum per gallon. There was some discussion of this paper, chiefly in the form of questions, one being as to the wear of the sand washer, in answering which Mr. Howard showed a part of a sand-washer tube which had been taken out after several months' wear and was exhibited at the meeting, and in which practically no wear was observable.

### THURSDAY'S SESSION

Thursday morning's meeting, the only meeting of that day, was down on the program as superintendents' session, and was opened by David A. Heffernan, superintendent of water works of Milton, who read a brief paper on the damaging of hydrants by automobiles. This was followed by a comparison of experiences by a number of superintendents. Among others, the average cost of repairing was given by several cities at $50 each, $40 to $50 in New Bedford, $40 to $65 in Boston, etc. New barrels were reported as costing $28.50, while Terre Haute repaired broken hydrants by welding at a cost of $5 to $6 each. Milton is now using a sliding-gate hydrant in order to prevent leakage if the hydrant should be broken. Apparently all cities experienced difficulty in collecting the cost of damaged hydrants from those responsible for the breaking. Dow R. Gwinn reported that the Terre Haute Water Company collected in about forty per cent of the cases. Several members apparently made little effort to collect except sending a bill; but one member included in the bill an estimate of the value of water wasted placing the estimate high with a view to reducing it in effecting a compromise on the bill.

Following this, the subject of protective coatings on cast-iron pipes was discussed, the fact being brought out that quite recently several foundries have had an unprecedented experience with such coatings. Although using the same bituminous material obtained from the same plants as heretofore, they have found patches of the coating disappearing from the pipe in a few days or hours after it had been placed in the yards. In some cases where the pipe had been loaded for transportation immediately, it arrived at its destination with these bare spots. No explanation has so far been found for the phenomenon. In the matter of touching up such bare spots after the pipe had left the foundries, it was reported that Boston uses "vulcanite" pipe paint. They had tried red lead on large pipe and found it very successful, first cleaning the pipe with scrapers made of oak or chestnut, followed by wire brushes, then washing out the dust. It was especially necessary to remove all rust and clean out all pitholes or depressions. For cleaning small pipe, brushes of the proper size were fastened to long poles extending each direction from the brush and pulled backward and forward through the pipe, while the paint was applied by an ordinary paint brush fastened on the end of a long pole.

No other subjects were discussed at this session, which adjourned at 10.30. The rest of the day was spent in an excursion to the plant of W. & L. E. Gurley, the Renssalaer Polytechnic Institute and the watershed of the city of Troy, followed in the evening by moving pictures illustrating the manufacture of steel pipe by the National Tube Company.

### FRIDAY'S SESSIONS

On Friday morning Paul Lanham, engineer in charge of waste detection at Washington, D. C., described the detection of losses from underground water distribution systems employed in that city. This has been carried on systematically for more than fifteen years and the results are on record and demonstrate the value of the service. The general method of detecting leaks by dividing the city into districts and using the pitometer to determine the amount entering each district has been described several times in Municipal Journal. Mr. Lanham showed lantern slides of some of the instruments employed, diagrams recorded by them, etc. He stated that in detecting leaks at service cocks, his inspectors used the aquaphone, preferring it to the more delicate microphone. Three members referred to the very satisfactory service given by a Darling instrument used for locating leaks as being very sensitive and locating a leak very exactly. Most of the leakage in Washington is found in service pipes, the great majority of them of black iron. Goose-necks have been found leaking at wiped joints and they are now set generally with lead flanges. The Waste Detection Service seldom has trouble with leaky valves, as these are kept in good condition by the Maintenance Department. The curb-cock boxes occasionally have to have the dirt removed from them before they can be closed in order to determine whether the leakage is beyond the curb cock or between it and the main.

Robert E. Horton read a paper entitled "Watershed Leakage," in which he explained by numerous illustrations and instances how the underground flow, especially around the edges of a watershed, did not always correspond with the surface or topographical watershed limits, water flowing toward the shed outside the topographical shed in some cases, and in others flowing from inside such a shed into the adjoining watershed

In the afternoon Frederick E. Beck, chief engineer of the Consolidated Water Company of Utica, N. Y., gave some experiences in metering fire services, which was followed by the interesting discussion which this subject usually occasions in water works conventions. One member told of finding a detectometer which had been accurate when first placed, but after having been in service a year or two, failed to register large streams at all; but as one member pointed out, it was the registration of the small streams that most of them were after. Another member told of a block of wood becoming wedged in the compound valve and deflecting the flow into the proportional meter, causing it to register much larger amounts than actually passed. The company using the water had paid several bills on the basis of such registration, and when the trouble was discovered collected several hundred dollars of such over-payment from the water company. In the absence of William W. Brush of the Department of Water Supply of New York, Mr. Sherman read the paper entitled "Dangerous Reduction to Insulation Resistance in High Pressure Fire Service Motors Due to Moisture."

In the evening, D. A. Decrow, manager of the water works department of the Worthington Pump and Machinery Corporation, described the principles of the Unaflow pumping engine, which that firm is developing, and tests made of the pump, which had been installed at the Porter Avenue pumping station of the Buffalo water works. The pump is still undergoing a trying out and testing by the company, and final conclusions as to the efficiency obtainable have not yet been reached.

The final paper was one describing some tests made of joints in cast-iron gas pipe, described by a representative of the United States Cast Iron Pipe and Foundry Company, as a substitute for the paper by Creed W. Fulton, Mr. Fulton having been on guard duty in Boston and therefore unable to prepare the paper or to be present to present it. The tests referred to had been made at Schenectady, during the week prior to the convention, by the Schenectady Illuminating Company in an effort to determine the best type of joint to use in their new 12-inch gas pipe line, through which gas is to be forced under 25 pounds pressure for a distance of about twenty miles, to supply Troy, Albany and Schenectady. A line of pipe was made containing several joints, some of neat cement mixed quite dry, one of neat cement made wet, and one made by first caulking in tarred oakum, then cement, then more oakum and finally lead. Special bells were used containing two caulking grooves, but otherwise the pipes were standard pipe of the United States Pipe and Foundry Company. In the last described joint, one of these grooves came about in the middle of the cement part of the joint and the other in the lead part. This joint was still tight when the pipe broke under 600 pounds hydraulic pressure. The cement joints were fairly tight, and were practically so up to 25 pounds air pressure, only a slight amount of bubbling appearing when using the soap test. However, special pains had been taken by the workmen to make the cement joints perfect, and in view of the importance to the company that there should be no leaks in this line, it decided to use the cement and lead joint rather than the cement alone.

### EXHIBITS

In connection with the convention, there was an exhibit of water works materials in the lobby and the adjoining parlors of the Ten Eyck hotel. The several booths were occupied with exhibits by the following firms: S. E. T. Valve & Hydrant Co., the Badger Meter Manufacturing Co., Hersey Manufacturing Co., Lock Joint Pipe Co., National Tube Co., Bingham & Taylor, Continental Jewell Filtration Co., Union Water Meter Co., Lead Lined Iron Pipe Co., United Brass Manufacturing Co., Pittsburgh Meter Co., Hays Manufacturing Co., Wallace & Tiernan Co., Inc., Electro-Bleaching Gas Co., Ford Meter Box Co., Joseph Dixon Crucible Co., Builders Iron Foundry Co., Central Foundry Co., Ross Valve Manufacturing Co., American City, Engineering News-Record, Fire and Water Engineer, Engineering and Contracting, Municipal Journal and Public Works, A. M. Byers Co., Eddy Valve Co., H. Mueller Manufacturing Co., Worthington Pump & Machinery Co., Pitometer Co., R. D. Wood Co., National Meter Co., National Water Main Cleaning Co., Thompson Meter Co., A. P. Smith Manufacturing Co., Neptune Meter Co., Carbic Manufacturing Co.

## SCHOOL BUILDING PROGRAM

Editor, Municipal Journal and Public Works,
New York, N. Y.

Dear Sir:

In a recent editorial you suggest a number of questions that may be properly asked when considering a school building program.

It will occur to you that the maximum use of present equipment should also be required before any such program is undertaken. I therefore venture to suggest certain additional questions dealing particularly with high schools and which have resulted from recent investigations made by the Detroit Bureau of Governmental Research, to-wit:

1. What proportion of school seats of present equipment is used for each and every period of the school day? Maximum use cannot be required, but it is of interest to note whether there is only a small percentage of seats used at the early and late periods.
2. What relation does the size of the classes bear to the size of the class rooms? Class rooms seating thirty may be used by classes of fifteen, and every room be in use. Theoretically, the attendance could be doubled without additional class rooms.
3. To what extent is use made of special rooms? Recitation rooms really determine school capacity. If recitation rooms are not properly apportioned to study rooms, laboratories, etc., one may find such special rooms with large seating capacity being used only at small extent.
4. Has the space per pupil in special rooms,—laboratories, manual training room, sewing room, etc., been economically determined so that there is no waste?

It might be imagined that these questions of school administration would have long ago been determined with the same precision as is used in the space of factories. However, these simple tests applied particularly to high schools may produce some highly interesting and valuable results.

Very truly yours,

Lent D. Upson,
Director.

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## INANCES OF CITIES

Of the 227 cities of the United States having more than 30,000 population, during the fiscal year 1918 two-thirds spent more than their revenue for governmental costs, including interest and outlays for permanent improvements, the average excess being $3.48 per capita. However, the expenditures of the cities as a whole exceeds the revenues by only $1.42 per capita, and the expenditures for current expenses and interest only were $6.70 per capita less than the revenue.

Of the total revenue of the cities, 70 per cent. represents receipts from various kinds of taxes. Next to taxes, the public service enterprises furnished the largest item of revenue, this totaling $116,494,645 or more than 10 per cent. of the total. The payments for expenses of the public-service enterprises was $55,174,480, leaving a net revenue from this source of $61,320,165. The bulk of these earnings came from water supply systems, the receipts from these aggregating $90,139,705. The public service enterprise earnings averaged $3.39 per capita.

The net indebtedness for all the cities averaged $77.53 per capita. The total net indebtedness for New York City alone was $1,005,055,422, which is more than 60 per cent. of the total for all other cities of over 30,000 population, although the population is only about 16 per cent.

The above figures are summaries from a report soon to be issued by the Bureau of the Census entitled "Financial Statistics of Cities Having a Population of over 30,000: 1918."

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## OFFICIAL ADVERTISING

STATE OF ILLINOIS
DEPARTMENT OF PUBLIC WORK & BUILDINGS
DIVISION OF HIGHWAYS
Springfield, Ill.
NOTICE OF ROAD WORK
BIDS TO BE RECEIVED NOVEMBER 12, 1919.

Sealed proposals will be received in the office of the Department of Public Works and Buildings, Division of Highways, Springfield, Illinois, until 10 A. M. November 12, 1919 for the road work designated below.

Plans for all work may be examined in the office of the Department of Public Works and Buildings, Division of Highways, Springfield, Illinois, and plans for the work in the several counties may be examined in the offices of the respective district engineers as shown below:

Vermilion County—R. L. Bell, Buchanan-Link Bldg., Paris, Ill.

LaSalle, Will and Grundy Counties—J. E. Huber, New Clifton Hotel Bldg., Ottawa, Ill.

LaSalle County—A. H. Hunter, 302 Apollo Theatre Bldg., Peoria, Ill.

Macoupin, Madison and Bond Counties—C. M. Slaymaker, 510 Metropolitan Bldg., E. St. Louis, Ill.

Except as noted, alternate bids will be received for the following types of construction: Portland cement concrete; monolithic brick (4 inch brick); monolithic brick (3 inch brick); bituminous concrete with binder course (specifications C1, C2, C3, or CT); bituminous concrete without binder course (specifications C1, C2, C3, or CT).

| Route | County | Sec. | Width Feet | Approx. Length |
|---|---|---|---|---|
| Danville-Hoopeston Highway | Vermilion | R | 8 | 25,600. |
| *Morris-Henry Highway | LaSalle | I | 19&30 | 13,460.3 |
| *Morris-Henry Highway | LaSalle | U | 30 | 8,369. |
| Joliet-Morris Highway | Will | E | 18 | 41,475. |
| Joliet-Morris Highway | Will-Grundy | F | 18 | 29,676. |
| Joliet-Morris Highway | Grundy | G | 18 | 40,109.3 |
| Springfield-E. St. Louis Highw'y | Macoupin | S | 16 | 25,415. |
| Springfield-E. St. Louis Highw'y | Macoupin | T | 16 | 15,830. |
| Springfield-E. St. Louis Highw'y | Macoupin | V | 16 | 21,235. |
| National Highway | Madison | 33 | 16&18 | 19,762.3 |
| National Highway | Bond | 34 | 16 | 19,307. |
| National Highway | Bond | 35 | 16 | 23,864.7 |
| National Highway | Bond | 36 | 16&18 | 20,223. |

*Earth road.

Cement will be furnished on all sections by the State or by the County.

By order of
The Department of Public Works & Bldgs.,
Frank I. Bennett, Director.

E. M. F.

S. E. BRADT,
Supt. of Highways.
CLIFFORD OLDER,
Chief Highway Engineer.

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## EQUIPMENT BARGAINS

*Bulletin No. 270—60 pages—is a*
**SURE MONEY SAVER**
*Get it—before buying*
**Contractors' Equipment, Cars, Rails, Mixers, Engines, Piling, Pipe, Bridges, Tanks.**
**ZELNICKER IN ST. LOUIS**

BIDS WANTED
Noon. November 19, 1919.
Maquoketa. Iowa.

Supplying and erecting one, approximately 250 B.H.P. Diesel type engine direct connected to 210 K.V.A. generator with belted exciter, oil tank, pole and line material, switch board and station equipment, Meters, transformers, etc. Extension to building 46x35.

Bids will be received on the plant complete or on material f.o.b. Maquoketa, Iowa, except engine, generator and station equipment. Information from G. O. Morse, Supt. Maquoketa. Iowa, or W. E. Skinner, Engineer, Lumber Exchange, Minneapolis. Minn.

### CITY ENGINEER WANTED

The Office of City Engineer of the resignation of the previous incumbent. City of Danville, Virginia, is vacant by Any Engineer of Municipal training and experience who desires to make application for appointment is invited to address the undersigned giving age, qualifications and such facts as may be material.

FRANK TALBOTT, Secretary.

# Municipal Journal & Public Works.

City County State

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## UTILIZING SEWAGE SLUDGE

In almost every method of treating sewage that has been devised, the critical feature is the disposal of sludge. By the use of screens, sedimentation tanks or filters, the liquid can be relieved of as large a percentage of the suspended matter as may be desired, within reasonable limits. But the problem remains of disposing of the matter so removed, which in a year or ten years totals an appaling amount.

If the claims for certain methods that they produce a sludge that can be sold for fertilizer, or recover grease for which a market can be found, can be made good, those in charge of solving the sewage problems of our cities would be more than pleased. Their present aim, in most cases, is to get rid of the stuff at all without creating a nuisance or incurring too great expense.

There seems to be increasing probability, however, that one or more methods will be evolved for disposing of sludge more satisfactorily and at less cost than by any method now in practical use. Those that are being tried out seem to be falling less short of the expectations of their promoters than was the experience of a few years ago.

It is interesting to those on this side of the Atlantic, as well as in England, to learn that the British government is investigating the subject, as reported elsewhere in this issue. Also that the two plans that have so far appealed most to these experts are the recovery of grease by the use of acid (which has been tried out in England for two or three years), and the conservation of nitrogen in the sludge for fertilizer purposes rather than its dissipation by the process employed. The latter is claimed to be effected by the activated sludge process, the former by the Miles process, both of which have been described at length in this journal. It is hoped that valuable light on the subject will be furnished by the activated sludge plants now operating in this country and the acid process plant contemplated by at least one city.

## FIELD SURVEYS OF WATER

The director of the Division of Sanitation of the State Board of Health of Minnesota, H. A. Whittaker, has reported that of 344 unsatisfactory water supplies in the state located by the board, laboratory analysis alone revealed eight per cent of them, but field surveys alone revealed forty per cent. That is, as a guarantee of the satisfactoriness of a water supply a sanitary field survey is five times as reliable as chemical and bacterial analyses.

The analyses are easier to make, they have their value and should not be omitted. But too many water superintendents send one or two samples of water a year to the state board of health, receive a report of "safe," and let it go at that. Such a report really applies to that particular sample only—an infinitessimal part of the water distributed by the system. Only a frequently renewed intimacy with the history of the water, such as would reveal possible sources of pollution, can be relied upon as a satisfactory guarantee of safety.

# THE TORONTO DRIFTING SAND FILTERS.

## Description of the Filter and Its Principle of Operation—Some Details of Operation—Variations in Turbidity Cause Difficulties—Bacterial Results Obtained—Policy of Operation.

Toronto, Ontario, in 1914-1917 constructed on Toronto island a mechanical filtration plant with several novel features, the principal of these being the use of the so-called "drifting-sand" type of filter. This filter was described in our issue of November 16, 1918. During 1918 it was operated in regular service purifying a part of the water of the city, the remainder of which is treated by a slow sand filter which has been in use for a number of years. The new filter plant has a capacity of sixty million gallons in twenty-four hours. The rate of filtration is 150 million gallons (here and elsewhere in this article imperial gallons are referred to) per acre per day. The two principles involved in its operation are the introduction of a coagulant without sedimentation and the necessity for there being a "drifting" as well as a stationary body of sand in the filter.

The latest data concerning this filter were contributed by Norman J. Howard, the bacteriologist in charge of the filtration plant laboratory, in a paper before the convention of the New England Water Works Association. He first described the plant, from which description the following most important features are abstracted.

### DESCRIPTION OF PLANT

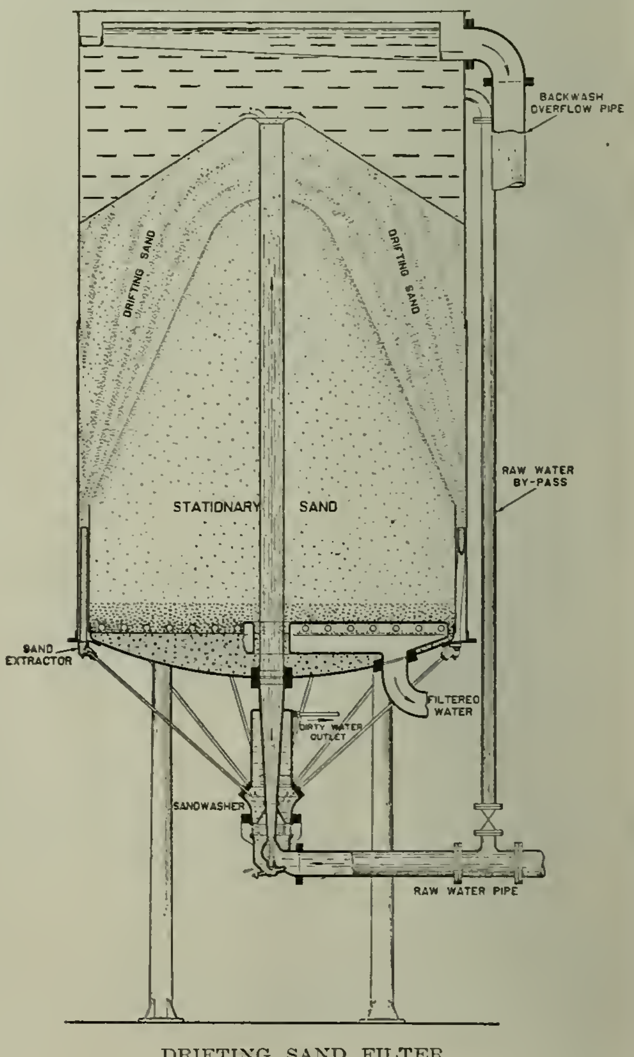
There are ten units, each with a nominal capacity of six million gallons per day (but a maximum rate of seventy-two million gallons must be maintained for a period of ten hours). Each is of steel, fourteen feet high and fifty feet in diameter and divided into thirty smaller units, which are nested together in two rings of eighteen and twelve units respectively. In the center of the filter is a cylindrical space 16⅔ feet in diameter, in which is placed the raw-water control balance. Each of the thirty units forms a separate quadrilateral unit with its sand extractors, sand washer, and filtered water collecting system. At the bottom of each filter, partly imbedded in concrete, is a cast-iron collector pipe for the filtered water, branching out from which are 1½-inch wrought-iron pipes with ⅜-inch holes drilled on the under side. On top of this collecting system is placed gravel in three grades varying from three-quarters of an inch to three-sixteenths of an inch, this gravel being ten inches deep. On top of this is nine feet of sand. No screens are used between the gravel and the sand. The sand has an average effective size of .375 millimeters and a uniformity coefficient of 1.6 to 2. The drifting sand is withdrawn from the filter by means of extractor pipes, through which the sand flows to the bottom of the filter unit into a sand washer, where the sand falls to the bottom through a current of raw water and thus is cleaned. The washed sand is picked up by the incoming raw water and enters the filter with the water.

The coagulant (sulphate of alumina) is introduced as the water flows to the filter, on the suction side of the pump. The water enters the filter partly through a standpipe placed vertically in the center of the unit, which delivers sand onto the filter from the top of the pipe, and partly through a by-pass. The sand so delivered forms a volcano-like cone. After operation has started, the sand in the body of this cone remains stationary, but immediately above the stationary sand moves the sand introduced by the incoming water. The rate at which the drifting sand is applied is determined by that of the raw water passing up the standpipe, which can be controlled, the balance of the water passing through the by-pass. It is found that the stationary sand forms a cone the slope of whose surface is about sixty-four degrees, while the cone of the drifting sand has a minimum slope of about thirty-two degrees. By causing the sand to drift across the path of the raw water, a large proportion of the impurities, including the hydrate of alumina and the bacteria which have been caught by the coagulant, are carried out with the drifting sand. The water then passes through the stationary sand, which finishes the purification.

The initial loss of head in the filters is six feet, which gradually increases to eleven feet, when the filter is backwashed. The length of run varies between one and seven days, according to the physical condition of the water and the amount of alum applied. The filters are washed by reversing the flow, water for this purpose being obtained from an elevated tank which gives a pressure of twenty-five pounds. Two hundred thousand gallons are used for washing the filter, the operation taking twenty minutes, after which the effluent is run to waste for twenty minutes. The amount of water used by the sand washer is two per cent and an additional one to two per cent is used for washing the filters and waste after washing.

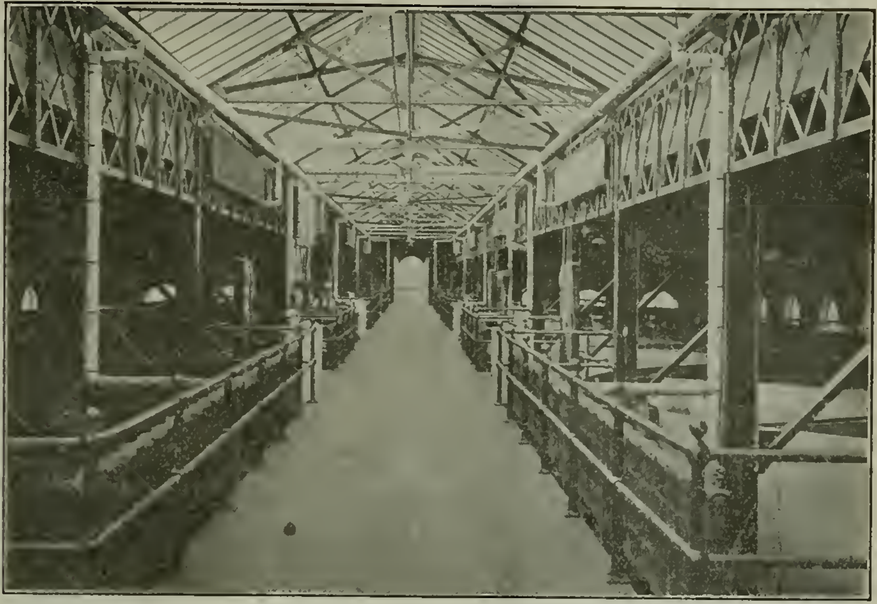
### OPERATION

As this was a new idea, it was expected that there would be problems and difficulties, but these have proved to be in no case serious and have been overcome with few exceptions. In the early days the biggest problem was to get a high-grade sand. At present the sand is not quite uniform, having an effective size which varies between .35 and .4 millimeters. Sand scour has been the most troublesome problem. When the filters were first put into commission, the cast-iron throats did not wear as long as was expected, and they were relined, first with extra heavy black iron pipe and finally with similar pipe carbonized. Porcelain was found unsuitable and experiments with rubber are now under way. A modified sand washer base has been tried which greatly reduces the scour, and a number are now being installed.



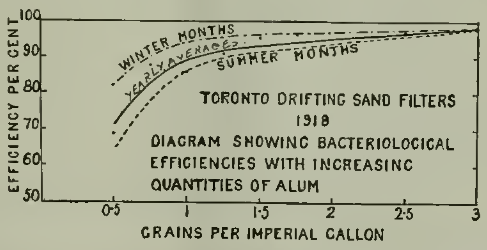
DRIFTING SAND FILTER.

It was found that Lake Ontario waters varied greatly in pollution and the purification effected under apparently the same physical conditions varied from time to time. Turbidify did not seem to affect the purification, except that it was necessary to increase the alum to secure clarification. In the winter months polluted water requires at least 1½ to 2½ grains of alum to obtain a satisfactory effluent. During the summer months it was found necessary to apply at least 2½ grains to a polluted water which often was free from turbidity. Water slightly polluted required about one grain per gallon. Raw water appears to coagulate slightly better in the summer months when the water temperature exceeds fifty degrees, but the final purification effected was lower than in the winter when the temperature ranged between thirty-three degrees and forty-six degrees. The microscopic content and that of the bacteria increased greatly in the summer months.



OPERATING GALLERY OF FILTER HOUSE.

The raw water is subject to very rapid changes, frequently becoming heavily polluted after less than eight hours' change in meteorological conditions. This makes treatment exceedingly difficult, as a sudden increase in pollution is likely to find an insufficient quantity of alum being applied and the efficiency of the plant is thus impaired.


EFFICIENCY PER CENT
100
90
80
70
60
50
WINTER MONTHS
YEARLY AVERAGES
SUMMER MONTHS
TORONTO DRIFTING SAND FILTERS
1918
DIAGRAM SHOWING BACTERIOLOGICAL EFFICIENCIES WITH INCREASING QUANTITIES OF ALUM
0·5
1
1·5
2
2·5
3
GRAINS PER IMPERIAL GALLON

EFFECT OF SIZE OF ALUM DOSE ON EFFICIENCY.

VIEW OF BUILDING HOUSING THE TORONTO FILTRATION PLANT.

Mr. Howard presented tables showing the results of the treatment during 1918, dividing the year into two periods, from December to May and June to November, because of the difference of action of the filter in the summer and winter months respectively. Three results are excluded in making up the averages because an insufficient quantity of coagulant was being applied at the time the sample was taken owing to a sudden change such as that just referred to. Excluding these three records, the average number of bacteria per c. c. on standard agar was 303.6 in the raw water and 34.7 in the filtered, with an average reduction of 88.4 per cent. The indicated number of B. coli in one c. c. were 6.08 in the raw water, and 0.22 in the filtered, with an average reduction of 96.4 per cent. The chlorinated water showed an average bacterial count of 1.72 per c. c., while only two samples out of 1,900 examined showed the presence of B. coli in one c. c.

### CONCLUSIONS

Conclusive evidence has been forthcoming from experiments and borne out by actual results, that Lake Ontario water can not be bacteriologically purified to a high degree by mechanical filtration, when only an average dose of aluminum sulphate of one grain per Imperial gallon is applied. But the actual purification effected by the drifting sand filters in 1918 was on an average application of 1.027 grains per Imperial gallon, and the results obtained on such a small amount are satisfactory. It has been clearly demonstrated that if a higher dose of alum was applied, a corresponding degree of purification was obtained. The economical question, however, had to be taken into consideration on account of the enormous cost of aluminum sulphate; and when it is considered that during periods of high pollution as much as 2.5 grains per gallon was applied, a definite economical as well as a practical policy of operation had to be adopted.

The summary of conclusions formed are as follows:—

1. That Lake Ontario water can be treated effectively by mechanical filtration.
2. During the year the composition of the water appears to undergo two distinct changes, which make the treatment of the water difficult.
3. That in the summer months more coagulant is necessary than in the winter period.
4. That the purification effected by the drifting sand filters during 1918, upon an average dose of one grain per gallon of alum, was satisfactory.

The plant is operated by the Department of Works, Commissioner R. C. Harris being the head of the department, with A. U. Sanderson as superintendent of the plant. The filtration laboratories, under the Department of Health, determine the amount of coagulant necessary. An excellent understanding has always existed between the two departments and close cooperation on the plant has made its operation a simple matter. Our policy of operation as at present defined is:—

1. Treat raw water at all times with sufficient aluminium sulphate to clarify the effluent effectively.
2. Obtain as high a bacterial efficiency as possible on an average dose of one grain per Imperial gallon.
3. Leave final sterilization to chlorine.

In conclusion, I would quote the last paragraph from the official report on drifting sand filters, October, 1918, by Col. G. Nasmith and the writer, which reads as follows:—

The decision we arrived at when the tender for the mechanical plant was first let, "That our former conception of a filtration plant was undergoing a material change; that sterilization of the water was the vital thing, from the public health standpoint, but that a filter was essential to clean the water, to keep the sand and dirt out of the water supply, and thereby prevent the wear and tear of machinery valves, taps, etc., as well as prepare the water for efficient sterilization; and that for a great portion of the year only a fraction of a grain of aluminium sulphate in conjunction with a slight amount of chlorine would be essential for filtration, thereby resulting in a great saving in the cost of operating," has been generally confirmed as a sound one, not only by ourselves, but by sanitarians in civilian and army work the world over.

## SIZES OF METERS

### Practice of the Interstate Water Company of Danville in Fixing Meter Sizes—Smaller Sizes Preferable.

In a discussion of the subject of meters before the Indiana Sanitary and Water Supply Association, W. Seilhymer, superintendent of the Service Department of the Interstate Water Co. of Danvill, Ill., gave the following information concerning the practice of that company in fixing meter sizes.

"The matter of oversizing of meters was considered by the Interstate Water Co. years ago. Owing to the small minimum that applies to all sizes alike it was compelled to install as small a meter as would possibly supply the demand. We find that a small meter (⅝ and ¾) will supply from ten to fifteen thousand cu. ft. per month for a period of about two years, with one or two trial tests in the meantime. After these tests it may be necessary to replace the disc and possibly the intermediate train gear, after which the life of the meter is practically renewed.

"We are getting more uniform readings on the smaller size meter, even when it is only one size smaller than the service. This is more noticeable on the smaller laundries and garages where the ¾-inch was installed in place of the 1-inch or larger. I believe in using the smaller size meter, considering at all times the legitimate needs of the consumer, as it decreases the first cost of the installation and adds to the monthly revenue by the more accurate registration of all the smaller flows that naturally will not be registered by a larger meter. In this way a company may be assured a more accurate registration than by granting most any size meter asked for by the consumer, who perhaps has the word of some architect who is not aware of the pressure carried at all times or by some plumber who is not qualified to speak on the matter. In all cases where larger meters have been asked for and the company exercised its right to determine the size, in no single instance has it been compelled to change the installation. It is a well understood fact between the company and the consumer when this kind of installation is made that if the service is not satisfactory we gladly give him the increased meter at no expense or inconvenience to him.

In connection with this is an instance of the setting of a 2-inch meter on a 12-apartment building that was designed and built by a foreign firm of contractors who installed a 2-inch service and a 2-inch meter was placed. The monthly readings were very uniform for a period of a few years, then the prop-

### BACTERIAL RESULTS

Showing the variation that occurs in the efficiencies in the winter and summer month periods.

Average number of bacteria per cc. in the raw and filtered water, with percentage reduction.

Showing number of days that B. coli was present in raw and filtered water, with percentage reduction.

| Month. | Raw Water. | Filtered Water. | Raw Water. 100 | 10 | 1 | .1 | .01 | .001 | Filtered Water. 100 | 10 | 1 | .1 | .01 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | WINTER PERIOD. | | | | | | | | | | |
| December | 534.39 | 33.35 | 25 | 23 | 18 | 11 | 5 | 1 | 25 | 16 | 9 | 1 | 0 |
| January | 42.23 | 3.31 | 22 | 11 | 8 | 1 | 0 | 0 | 13 | 7 | 0 | 0 | 0 |
| February | 7.42 | 1.21 | 24 | 15 | 2 | 1 | 0 | 0 | 22 | 8 | 2 | 0 | 0 |
| March | 42.98 | 3.24 | 23 | 17 | 7 | 3 | 0 | 0 | 19 | 10 | 3 | 0 | 0 |
| April | 73.44 | 5.62 | 24 | 19 | 13 | 6 | 0 | 0 | 23 | 10 | 6 | 0 | 0 |
| May | 28.73 | 5.62 | 25 | 15 | 5 | 0 | 0 | 0 | 24 | 13 | 2 | 0 | 0 |
| Removal 92.8%. | | | Total Removal 97.8%. | | | | | | | | | | |
| | | | SUMMER PERIOD. | | | | | | | | | | |
| June. | 108.54 | 11.38 | 21 | 14 | 2 | 1 | 0 | 0 | 18 | 4 | 0 | 0 | 0 |
| July | 97.08 | 19.92 | 22 | 14 | 4 | 1 | 0 | 0 | 24 | 14 | 3 | 0 | 0 |
| August | 653.2 | 67.31 | 26 | 24 | 15 | 4 | 0 | 0 | 26 | 23 | 9 | 0 | 0 |
| September | 738.6 | 128.80 | 24 | 19 | 11 | 5 | 0 | 0 | 24 | 16 | 10 | 0 | 0 |
| October | 1,382.46 | 290.5 | 26 | 21 | 15 | 9 | 0 | 0 | 26 | 18 | 7 | 2 | 0 |
| November | 779.6 | 33.32 | 24 | 13 | 7 | 1 | 0 | 0 | 25 | 19 | 7 | 0 | 0 |
| Removal 84.1%. | | | Total Removal 75.8%. | | | | | | | | | | |

erty changed ownership and about this time we were short on the larger sizes of meters and it became necessary to have a 2-inch meter, and having none in stock it was removed and in its place a 1-inch disc meter was set which increased the next five months registrations over the preceding five months from 61,000 cu. ft. to 94,000 or about $6.84 in the monthly bills, and all this without a protest from the consumer.

A 6-inch proportional meter was replaced by a 4-inch meter where the use was varied from nothing to several thousand cu. ft. per month, the 4-inch increased the monthly consumption more than 10% and this service has never dropped to the minimum since the installation of the 4-inch meter.

The replacing of a 4-inch piston meter on a R.R. tank by a 3-inch meter of the same kind increased the revenue almost 25% the first month. The 4-inch meter was tested on low flow after being taken out and it was found that it was not registering the lower flows, such as occur so frequently in this kind of delivery. The meter was all right on the larger flows.

Regarding the testing and repairing of meters, will say that the Illinois Utilities Commission makes it mandatory on us to test all ⅝-inch meters after a delivery of 100,000 cu. ft. or at the end of ten years, providing that the meter is not tested on the demand of the consumer who may, if the meter has not been tested in the last twelve months, demand a test that he is entitled to free of cost; if the meter has been tested in this time and the consumer wants a test, same will be made on his request and by depositing $2.00 with the company. In case the meter tests within the legal limit, as it invariably does, the fee of $2.00 remains with the company to pay for the test. In almost all cases of request tests the consumer seems satisfied, especially if he is shown the internal mechanism and the working of the meter and is advised how to determine if he has any leakage or his attention is called to the requirements of his premises.

## CRENOTHRIX REMOVAL BY CHLORINE

The removal of crenothrix from iron-bearing waters was the subject of a paper before the Indiana Sanitary and Water Supply Association by W. F. Monfort, consulting engineer of St. Louis. Experiences with crenothrix led him to conclude that:

"Filtration of water supplies infected with crenothrix removes organic matter, which is probably the essential foodstuff of the organism. Iron removal is probably incidental; carbon dioxide removal may be either partial or total; both are believed to be non-essential to the life and growth of crenothrix.

"The destruction of crenothrix and accompanying putrefactive bacteria by the germicidal action of chloramine ($NH_2CL$) or chlorine before filtration facilitates iron removal, and insures the supply thus treated against subsequent development and putrefaction of crenothrix.

"A practical test through a period of more than a year has shown 4.5 pounds of chlorine per million gallons of applied water effective in clearing a seriously infected system of filters, reservoirs, mains and service pipes of all accumulations, rendering the water free from taste, odor and color. The iron content is reduced to 0.1 part per million."

The feature of special interest is the conclusion that crenothrix does not require iron or carbon-dioxide but does require organic matter in the water; and that removal of iron does not prevent after-growth of crenothrix. Also that the odors caused by crenothrix are due to putrefactive bacteria which act upon the dead crenothrix. This opinion was based upon experiences such as that at Superior, Wis., where slow sand filters eliminated crenothrix, which did not reappear in the effluent even when the water was not aerated; (although aeration facilitated the operation of the filters). Presumably, bacterial changes occurred in the schmutzdecke and the sand occasioned a change in the organic matter unfavorable to the later growth of crenothrix.

The "practical test" referred to was conducted during 1918 and 1919 at the plant of the Champaign-Urbana Water Co., where 4.5 pounds of chlorine per million gallons was applied to well water before filtering. The manager of the plant, Mr. Amsbary, said: "The crenothrix growth had possession of the filter beds, rendering them inefficient; the reservoirs were foul with it, requiring frequent cleaning. The distribution system was supporting its proportion. Since pipes were stopping up all around the city, the situation was serious indeed. The use of chlorine, introduced into the raw water as it enters the filter beds, had an immediate effect on the crenothrix, causing it to disappear, and since its use began, we have been free of the pest. The filter beds are easily kept sweet and clean; efficiency 90%, and no growth can be detected in the basins or distribution system. It has been a great relief, as complaints which were numerous before its use, have entirely ceased since chlorine has been used."

Mr. Amsbary's reference in the phrase "efficiency 90%" is to the per cent. of iron removal from 2 parts per million in the raw water to about 0.1 p.p.m. in the filtered effluent, which is rather better than the average of earlier results here.

The filter beds, which are supplied with fine sand, show a reddish film when drawn down, but filaments of the organism formerly so persistent are not found. This seems to indicate that chlorine treatment is efficient in preventing growth of this and its attendant bacteria. Upon scraping away the top ¾ inch of fine sand, there was found fresh, uncolored, unmatted sand, indicating that iron removal was occurring at the surface only.

## RESURFACING A CONCRETE PAVEMENT.

Concrete bridge floors on two steel bridges belonging to Tioga County, N. J., were resurfaced by a method that might, it would seem, be applied to roads also. The original floors were concrete slabs 3 inches thick resting on the steel floor members, with expansion joints 18 feet apart. They carried unusually heavy traffic, largely freight for nearby coal mines, and after seven years were in urgent need of repair. How these were made is described in "Concrete Highway Magazine" by James Crawford, commissioner of Tioga county.

The concrete was thoroughly swept to remove all dust, and washed clear. There was then applied to the entire surface a 5 per cent. solution of hydrochloric acid to remove the cement coating from the aggregates. After stopping the action of acid by thorough washing with clean water, there was applied a thin wash of cement grout over the entire surface, immediately followed by a 2-inch layer of concrete.

Clean hard trap rock, uniformly graded from ¼ to ¾ inch, was used as coarse aggregate. This was mixed with clean, hard sand and cement in the proportion of 2½ sacks cement, 1 cubic foot of sand, and 5 cubic feet of trap rock. Just enough water was used to make the batch plastic and workable. No joints were placed in the resurfacing layer. As a result, hair line cracks appeared within a month or so immediately above the old expansion joints. These cracks form a straight line across the pavement and have shown no indications of developing rounded edges or other damages.

After two years of use this work was carefully examined and showed no sign of broken bond or cleavage where old and new concrete join, no cracks except the hair line ones above the old expansion joints, nor any other evidence of wear from the regular heavy traffic to which exposed—in fact, the job may be regarded as satisfactory in every way and the methods used can be recommended as successful practice for similar conditions. The surface is as even and regular as when finished.

## PAVING NORTH CAROLINA STATE ROADS.

W. S. Fallis, state highway engineer of North Carolina, has issued a "notice to contractors" under date of October 11th, relative to the "types of road surfacing preferred by the state." In this he says: "We feel that it is due the contractors that are bidding on our work to make perfectly clear the attitude of the State Highway Commission as to this matter.

"The following types of surfacing all complying with our standard specifications will always be on an equal basis; Plain Concrete, Warrenite, Topeka and Willite. Any responsible contractor bidding low on either of these types will be given the work regardless of the type on which the low bid is made. This notice is intended to include all State lettings after this date.

"This is to assure all who bid on the types named above, that the party who bids low on either type, concrete or asphalt, will be awarded the work."

## BRIDGEPORT'S SEWAGE SCREEN AND PUMPING STATION

### Description of Underground Station, Disc Screen and Centrifugal Pumping Plant Now Under Construction.

By JAMES A. McELROY*

In a previous article† an account was given of the studies made under the direction of the Paving and Sewer Commission of the City of Bridgeport to determine the most appropriate and economical method of sewage disposal for this city. The result of these investigations led to the adoption of the fine screen method of treatment.

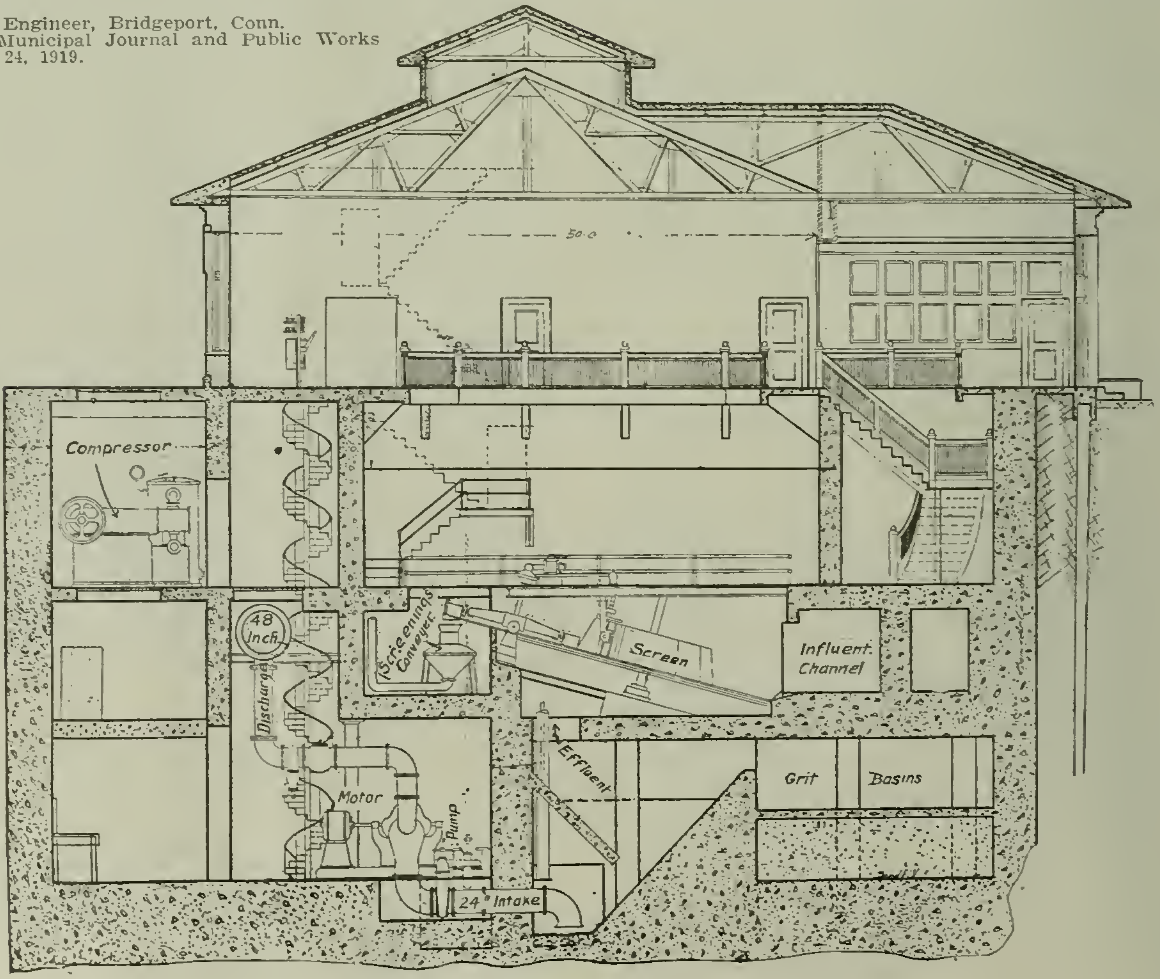
Work was started about the first of the year on the construction of the combined treatment plant and pumping station for the Western Sewage District. This plant was designed for an ultimate capacity of 35,000,000 gallons per day, dry-weather flow. At present, equipment to handle two-thirds of that quantity is being installed.

The sewage is carried through a 72-inch interceptor to the pumping station, located on the water front at the foot of Bostwick avenue. The present contract calls for 300 feet of 72-inch sewer from the street into the station, a 72-inch automatically operated sluice gate, the combined pumping station and treatment plant, with all equipment, a portion of the outfall including a venturi tube and a 60-inch electrically operated gate valve.

The sub-structure is a reinforced concrete caisson, 80 feet inside diameter and 45 feet deep. The cylindrical shell forming the outside wall of the caisson is constructed of a series of rings 10 feet high. The rings were cast above ground and after the concrete in each ring had properly set, the forms were removed and the ring sunk until the top was approximately a foot above ground. The forms were then re-assembled and the next section cast. When the caisson had reached the predetermined depth, the bottom was placed under water. After the concrete bottom had set the caisson was unwatered, the bottom made tight and finished to a surface. This part of the work has been completed, and the partitions, walls, piers, beams, and floor slabs will next be built. The superstructure will be rectangular in shape and constructed of reinforced concrete, tapestry brick, and stone trimmings, with a French red tile roof. The work of construction will be described in another article after the structure has been completed.

The sewage from the interceptor will flow through the sluice gate to a bar screen at elevation 100, thence through a concrete channel to the screens. The screened effluent will flow over an adjustable weir to the sump at elevation 80, then be lifted by the pumps to the force main at elevation 105.

The flow to each screen will be controlled by a specially designed swing type diversion gate. This gate is constructed of cast iron and is operated and controlled by



SECTION THROUGH SCREEN AND PUMP HOUSE.

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*City Engineer, Bridgeport, Conn.

†See Municipal Journal and Public Works for May 24, 1919.

means of worm gearing and hand wheel. All wearing and bearing parts are bronze mounted.

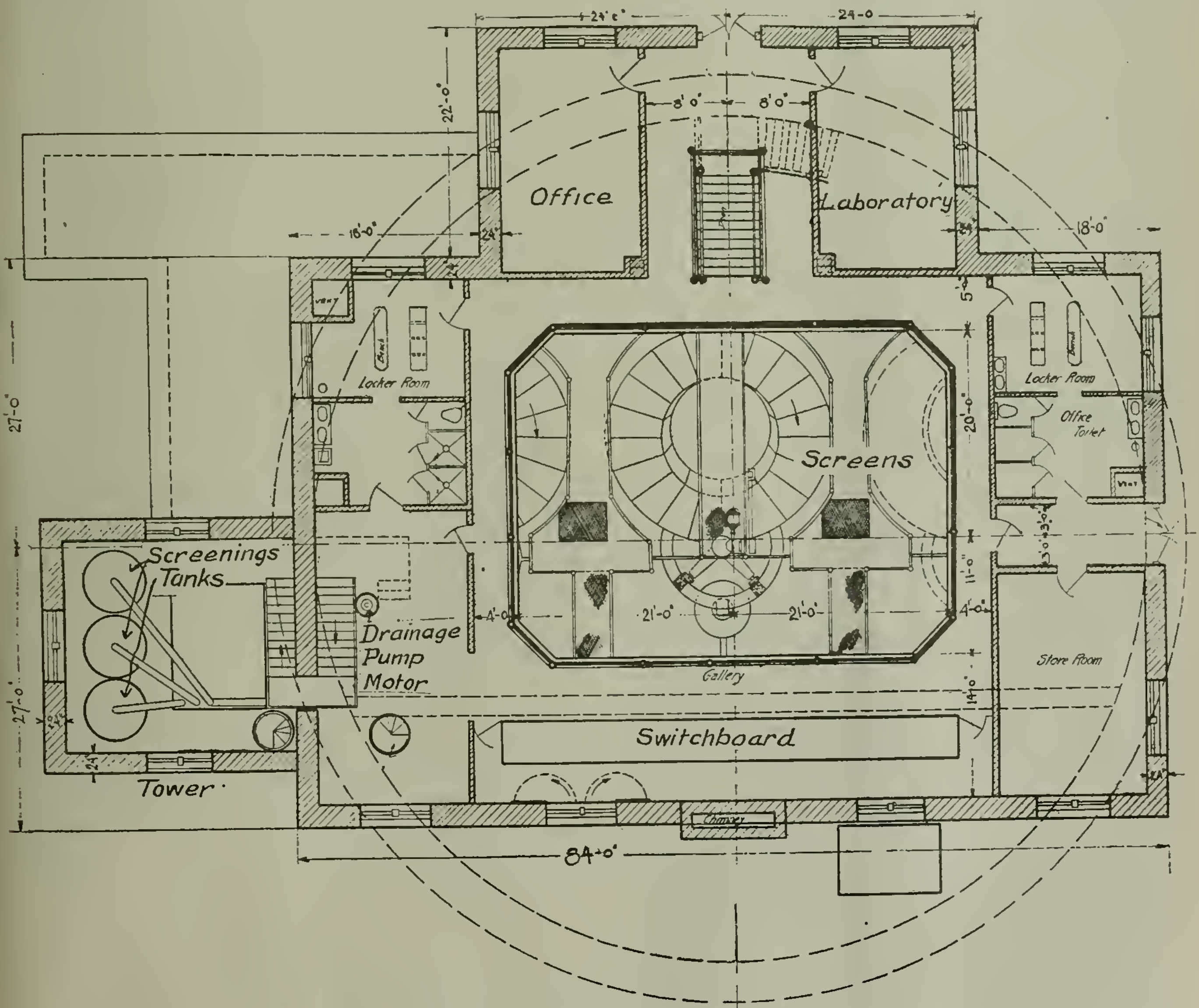
The plant is designed for three Sanitation R. W. screens each 22 feet in diameter, two of which will be installed under this contract. The special feature of this process of sewage treatment is the Riensch-Wurl rotating screen disc. The device consists of a circular disc 22 feet in diameter inclined at an angle of 15 degrees to the horizontal. A truncated cone, the base of which is 12 feet in diameter is centrally mounted on the disc. Removable manganese bronze screen plates are fitted to the disc and cone surface. These plates are perforated with rectangular slots 2 inches long by 3/64 of an inch wide. The lower portion or toe of the screen disc is set at the elevation of the invert of the influent channel. The angle or slope of the screen disc is such that the maximum high water level of the sewage will be below the top of the cone, and approximately 1/3 of the screen disc will be above water at all times. The screenings are carried on the disc, and are swept off the surface by six revolving cylindrical brushes. These brushes are carried by and rotated on a cast steel spider mounted on a shaft parallel with the main disc shaft. The surface of the cone is cleaned by a vertical rotating brush of the same general design as the disc brushes. The brushes consist of cylindrical bodies made of aluminum, the outer surfaces of which are drilled and the holes counter-bored, into which wild-hog bristles are wire drawn.

The sewage flows against the screen, which is constantly slowly rotating on its axis (approx. ½ r. p. m.), the effluent or liquid passing through the screen to be discharged into the pump sump. The screen surface retains the suspended solids which are gently raised out of the flow and removed from the plates by the brushes and deposited in the hopper of a screenings-conveyor system. From this hopper the screenings are conveyed to storage tanks, each of which has a capacity of five cubic yards.

From these tanks the screenings will be loaded into tank wagons and hauled to the city farm, where they will be mixed with stable manure and composted by placing alternate layers of screenings and stable manure or dirt, each layer being approximately 4 inches deep.

The screenings will be conveyed from the hopper to the storage tanks by a pneumatic system, which is a closed system and is very effective and sanitary as it obviates the unsightly handling of the same in open cans or on conveyor belts.

The screens will be driven by electric motors located on the operating bridges and directly connected to the driving mechanism by means of a centrifugal clutch



PLAN OF MAIN FLOOR OF SCREEN AND PUMP HOUSE.

coupling and worm gear. All the bearings on the screen will be lubricated from a central lubricating system located on the bridge and easily accessible to the operator. The motors will be controlled by push buttons located on the operating bridge and on the switchboard.

Each screen chamber will be connected to the pump sump by a specially designed concrete channel, through which the effluent from the screen flows. To regulate the loss of the head through the screens, a specially designed weir-type sluice gate will be installed at the entrance to the effluent channels.

When the flow is light and only sufficient for one screen, the influent and effluent gates of the idle screen will be closed, and the screen pit drained and cleaned. A covered manhole provided with a metal ladder will be located in the floor and on the flow side of the effluent gate for easy inspection of the gate and access to the screen pit.

The pumping equipment or main pumping unit will consist of two 20-inch horizontal double-suction volute centrifugal pumps, each having a normal capacity of 15 million gallons per 24 hours, and two 15-inch centrifugal pumps, each with a normal capacity of 8 million gallons per 24 hours. These pumps will be direct connected to electric motors by means of a flexible coupling and will discharge the screened effluent through a 60-inch discharge main into Long Island Sound. The main pump motors will be controlled and regulated by floats actuated by the water in the pump sump. The floats are adjustable and electrically connected to solenoid switches and automatic motor starters mounted on panels of the main switchboard.

A venturi tube is to be installed in the outfall to measure the entire flow through the plant; the graduated dial and recording chart and register for the venturi to be mounted on one of the main switchboard panels. A 60-inch electrically operated gate valve will be installed in a gate house built at the discharge end of the venturi tube.

The main switchboard will control all the electrical apparatus and lighting circuits of the entire plant. It will be located on the main floor and consist of 13 marble panels 90-inches high.

A complete system of electric lighting, plumbing, heating and ventilation will be installed, as well as accommodations and comforts for the welfare of the operators.

## PROPERTY OWNERS NOT TO SELECT PAVING

At a recent special meeting of the New Jersey Association of County Engineers, a resolution was presented by Frederick A. Reimer of Essex county and unanimously adopted, stating that the association strongly protests against and condemns a practice which had prevailed in many counties of the state (and is found in other states also).

As stated in the resolution: "The selection of paving materials requires expert knowledge of the probable life of these materials when subjected to the different classes of traffic. It has been the practice for many years for governing bodies to be influenced, in the selection of materials to be used for paving, by petitions from owners of property abutting upon the line of improvement. By such selection, the advice, opinion and knowledge of experienced engineers has many times been rejected, resulting in the improper selection of paving materials. The constantly increasing use of the highways in state, county and municipality demands the proper, economical and efficient development of all the highway systems in the selection of proper materials to be used in construction and maintenance." The association strongly protests against and condemns the continuation of this practice "as being against the best interests of the municipality, conducive to excessive cost and contrary to the best engineering practice."

This used to be the practice in a great many cities, but for city work it has largely been discontinued, after the scandals arising from the acts of agents of paving material manufacturers in influencing property owners to recommend their particular materials had been aired in numerous suits in the courts and aroused the public to the evils of the practice. There certainly is no more reason why it should continue in the case of county and state highways than in the case of city streets.

## SLUDGE UTILIZATION IN ENGLAND.

### Report of Governmental Committee on Utilization of Sludge—Recovery of Grease and Nitrogen.

Toward the end of 1918 the British government, at the request of the Institution of Municipal and County Engineers, authorized the formation of a committee to investigate the question of recovering from sewage sludge any products that may be worth salvaging. The National Salvage Council had already made preliminary inquiries at the Bradford and Huddersfield sewage works which convinced them that grease was being recovered profitably at both places. The committee formed consisted of one representative each of the following: the Local Government Board, the Board of Agriculture, the National Salvage Council, and the Institution of Municipal and County Engineers; in addition to which an engineering expert and a chemical expert on the salvaging of grease were appointed to the committee.

In its report this committee recommends a further study into the grease content of local sludges in various cities, as it is of the opinion that where a sludge after acidification contains 15 per cent of grease calculated on a perfect dry basis, it is profitable to recover the grease, provided the selling price is not less than $75* per ton and 100 tons of wet sludge are available for daily treatment. This value does not include that of the dried, degreased sludge, which is salable and, provided the nitrogen content is two per cent or more, has a market value of $2.50 to $7.50 per ton.

The committee estimates about 250 tons of wet sludge annually per thousand of population, which would give 600,000 tons of dry matter passing through the various sewage treatment plants of England, of which it estimates that not more than 12½ per cent is now being used for fertilizing purposes.

The committee is of the opinion that, although sludge after air drying or pressing does not contain sufficient nitrogen to enable it to compete with artificial fertilizers in manurial value, yet there is sufficient nitrogen in pressed sludge, as it is removed from the tanks, to give it a definite fertilizing value. Also, that considerable quantities of nitrogen are lost by delay in disposal, in some cases as much as 50 per cent of the original quantity in the sludge, and that, from the point of view of possible fertilizing value, the nitrogen so lost is the most valuable of that originally present.

It is recommended that effort be made to increase the manurial value of sludge by some method of treatment designed to fix more of the original nitrogen in the sludge. If this can be done, it would probably add a value of $2.50 per ton for each additional per cent of nitrogen retained in the sludge for use as fertilizer. To this end, experiments should be carried out on a considerable scale at selected disposal works in order to ascertain the best method of dealing with sludge so as to retain as much as possible of the original nitrogen and produce a fertilizer or fertilizer base

Although it has not gone thoroughly into the matter, it would appear from visits made by the committee to Manchester and Sheffield, where the activated sludge method is used, that the residual sludge from such processes contains a higher percentage of nitrogen and consequently would be of greater value as a fertilizer than sludge from plants in ordinary use.

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*All prices in this article are changed to American money on the basis of $5 to a pound.

Says the committee: "We are strongly of opinion that the time has arrived when a government committee should be appointed to follow the recent developments in the treatment of sewage by-products, with a view to collecting information for the guidance of local authorities and for the benefit of agriculturists."

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## WATER SUPPLY FOR THE CANTONMENTS.

### Preparing Plans Under Emergency Conditions—Quantity Provided and Actual Consumption—Standard Plans for Distribution Systems and Other Features.

The emergency construction of the cantonments after the entrance of this country into the war involved a large amount of most interesting engineering work, some of which derives its interest from its unusualness and has little of permanent value unless similar emergency conditions may again arise, while other features of the work may undoubtedly prove to contain lessons which will be of permanent value. Although much was written at the time by outsiders, those who were engaged in the actual construction were too busy to even consider the preparation of descriptions of the work which they were doing. Such descriptions are now appearing from time to time. One of the latest is in the form of a paper presented to the American Society of Civil Engineers by Dabney H. Maury, Lieut-Col. of the Quartermaster Corps, advisory engineer in general charge of water supply for the Construction Division of the Army, and for many years a prominent water works engineer.

Mr. Maury was called into the service of the Construction Division of the army on May 28, 1917, when the personnel of the office comprised between forty and fifty men. By October the number had increased to 700, by March, 1918, to 1,400, and when the armistice was declared on November 11, the force in the Washington office alone numbered 2,800 and there were about 25,000 more scattered all over the country, in addition to the 200,000 laborers and other employes of the contractors.

The problem presented to the division was to construct, on unprecedentedly short notice, sixteen camps each to house about 40,000 troops. There were difficulties in obtaining on such notice as much of either material or labor as was necessary. The use of both iron and steel had to be avoided as far as possible since both of these materials were urgently needed for ships, guns and munitions.

As for water supply, there was above all the paramount necessity for absolute safety in the quality and for a quantity and pressure sufficient to meet the demands of men and horses and also for fire protection.

#### QUANTITY REQUIRED.

More consideration was given to the determination of the proper quantity than to any other question, and Leonard Metcalf and George W. Fuller were called in to assist in the determination of this. The result was the preparation of a general specification providing that the several systems should be capable of furnishing at least 55 gallons per capita per day, five of which was for the horses on the basis of 15 gallons for each horse or mule. While this quantity is less than is allowed in planning for most city supplies, there are many cities in this country in which the average consumption is less than fifty gallons, including all waste, leakage, and public, industrial, commercial and manufacturing uses.

Experience proves conclusively that for the cantonments this allowance was a very liberal one. Although it was impossible to prevent all leakage and waste, it is easy in military camps to keep the total consumption down to twice the maximum legitimate quantity actually required, and this quantity was estimated at not more than 20 to 25 gallons per day. When the sixteen national camps were first occupied there were only a few of them in which the consumption exceeded 55 gallons and in several it was less than 40, although at this time there was practically no check on the use or waste of water, as the Utilities Organization had not yet been perfected. However, during the severe winter of 1917-1918, the daily per capita consumption in some instances exceeded one hundred gallons, due partly to leaks in plumbing, but largely to the fact that water used for heating was not returned but was blown to waste and this alone accounted for 600,000 gallons per day per camp. By the end of the winter the Utilities Organization had begun to secure a great reduction in this and other kinds of waste, and in the early summer of 1918 the consumption was reduced to less than 55 gallons at practically all the camps, without the slightest inconvenience or shortage of water for anyone. The utilities officers made water-waste surveys and frequent inspections and repairs of plumbing, which work not only greatly reduced the waste of water, but showed conclusively that the excessive consumption was due almost entirely to waste and leaky fixtures and that underground leakage was almost invariably negligible.

The matter of water allowance was referred to in several of the discussions of Col. Maury's paper. P. H. Norcross stated that at the beginning few if any of the supervising engineers concurred in his suggestion of 55 gallons as ample, but this "early difference of opinion has been supplanted with almost unanimous approval by the consulting engineers and the military establishment." Morris Knowles said: "There is no doubt that many felt, at the time of this decision, as the speaker did himself, that there was serious doubt whether a limitation of designs and installations to a basis of 50 or 55 gallons per capita per day could be successfully applied. It is clear that the success which justified this decision was due, in a large measure, to the restrictive measures inaugurated for preventing excessive use and for distributing the peak loads by planning hours of use for various purposes." George A. Johnson, in a written discussion, said: "All the water systems had been designed on a basis of a certain fixed estimated number of troups and animals at each individual camp and a factor of safety of 2.85 times the average demand allowed in order that peak load consumptions might be anticipated satisfactorily. The rapidly fluctuating camp population was perhaps the most difficult problem for the operator to meet, and a matter which the designers of the water systems could not anticipate with precision. A notable case in this line was Camp Dix, which was laid out in all its parts for a maximum population of less than 45,000. At 3 P. M. on one day the population was 44,000. At 10 A. M. the following day it was 60,000. With the facilities provided by the designers and the exercise of considerable resourcefulness on the part of the utilities officers, however, every man was adequately supplied with water, and fire protection requirements were met."

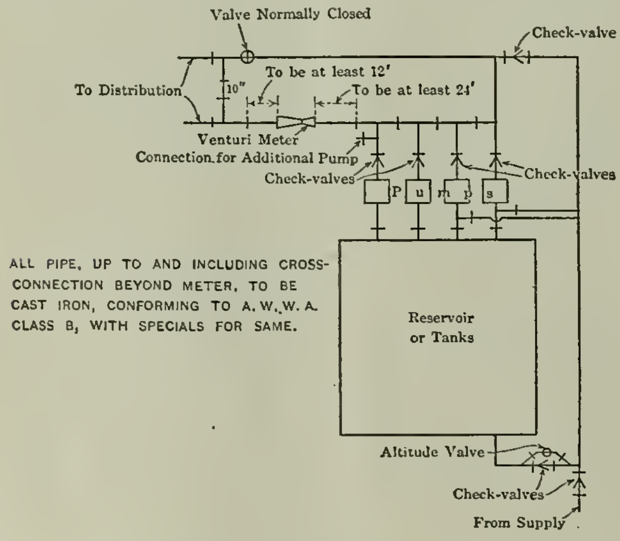
As to the sufficiency of the supply for fire protection, Col. Maury said that many thousands of fires have started in the frame buildings at the cantonments, but in only three cases has a fire escaped beyond the building of its origin. In each case the fire department at the camp succeeded in saving a part of the barrack building in which the fire originated and a part of the mess hall to which it spread. These fires were extinguished by the fire protection afforded by direct pressure from the water works systems of the cantonments. The per capita loss by fire throughout the United States in 1918 was $2.70, but the per capita loss by fire at the cantonments, camps, etc., for the year ending June 30, 1918, was only 67 cents.

### STANDARD PLANS.

Days and even hours were of vital importance in getting the work started and no time could be lost in preparing plans not absolutely essential. It was manifest that no definite arrangement of units of camp structures could be adhered to for all cases, as the topography of the camp sites varied; but it was possible in almost every case to prepare unit group plans of buildings which could be strictly adhered to, the variations being in the arrangements of the several units. This permitted the preparation of standard plans for each unit, showing the location of mains and location and sizes of service pipes in each unit. The length and size of mains and their location outside the limits of the individual units were governed in each case by the topography and by the point at which the water supply was delivered to the camp.

There were three general classes of grouping of buildings, in one of which the units were strung out in a single line and the supply came in at one end, in another the supply came in at the center, and in the third the units were grouped in a horse-shoe form. The last was the ideal arrangement, since it gave an opportunity to loop the mains so as to connect the ends of the horse-shoe, which greatly reduced the friction losses and enabled smaller mains to be used.

Typical plans were prepared, for each of which there were determined economic location and size of mains, gates and fire hydrants, so that as soon as the first rough plan showing the approximate grouping of the units for any camp reached the office, it was possible to specify at once the sizes and approximate lengths of mains required and to place orders for most of the water works materials needed.



ALL PIPE, UP TO AND INCLUDING CROSS-CONNECTION BEYOND METER, TO BE CAST IRON, CONFORMING TO A. W. W. A. CLASS B, WITH SPECIALS FOR SAME.

WHERE PUMPS DO NOT TAKE SUCTION UNDER HEAD, PROVIDE SUITABLE PRIMING APPLIANCES IN DUPLICATE.

WHERE EXCESSIVE PRESSURES MIGHT OTHERWISE COME ON MAINS, AS THE RESULT OF SHUTTING OFF DRAFT WHILE PUMPS ARE RUNNING AT HIGH RATES, SUITABLE RELIEF VALVES SHOULD BE PROVIDED AT PUMPING STATION.

TYPICAL ARRANGEMENT FOR PUMPING STATION

Construction details for typical layout of pumps, reservoir, tanks, meter and pipe connections, for water systems in which supply is delivered into storage and has to be pumped thence into the distribution mains, and where there is no elevated storage on distribution mains. Where there is such elevated storage, the number of pumping units may be reduced.

Mr. Maury cited one instance, that of Camp Lewis in the state of Washington, in which, on the day of his arrival on the ground, the officer of the Building Division sent to determine the location, wired as follows:

> Refer Government Maneuver Map. No. 69. Follow railroad southwesterly from American Lake to Dupont Station. Draw line easterly from this station to point midway between Spray Lake and Spray Farm. This line is the center axis of camp, which is in typical horseshoe plan with open end eastward. Source of water supply, wells and springs between American Lake and Sequalitchew Lake. Site for reservoir, Hill No. 320; actual elevation, 390. Engineering Division wire sizes and lengths of water mains repaired."

This telegram arrived at the Washington office just before midnight, and within two hours the Engineering Division wired the information required, which information enabled the pipe for the distribution mains of the camp to be ordered immediately from the nearest Pacific Coast fir pipe manufacturers. A few hours thus sufficed to settle a basic question in connection with a cantonment more than 3,000 miles away. Although the location of this camp was not definitely decided until after June 28, the camp was ready for troops on September 1.

As soon as topographic maps of a camp site could be prepared showing the general arrangement of the structure units, a blue-print was furnished to the Construction Division and the locations and sizes of water mains, fire hydrants, valves and other accessories were drawn on with red pencil, and from these penciled blue-prints the necessary materials were scheduled and the schedules sent to the Materials Division for purchase. The blue-prints with the red marks were then sent back to the drafting room and traced as a water-works drawing and blue-prints from these tracings were forwarded to the camps. This plan enabled the ordering of materials immediately and they were frequently on their way to the camp before the plans had reached there.

In most cases there were at least two duplicate supply mains to the camp from both pumping station and reservoir and there were very few dead ends. Hospitals offered special difficulties in the way of fire protection because the corridors connecting the buildings eliminated fire-breaks and interfered with access to the interior courts between buildings. To offset these disadvantages as much as possible, hospital groups were given duplicate supply mains, the distribution mains were thoroughly looped and gated, the hydrant spacing was made unusually close and, wherever possible, openings were left under the corridors at strategic points.

As soon as the general features had been determined upon, general specifications and typical construction details were prepared and sent out, as well as a schedule of service pipe materials necessary for each unit in a cantonment. The standard details included methods of setting valves and hydrants, of connecting wood stave pipe to cast iron pipe or specials, of making connections between mains, of making bends in mains, of connecting service pipes to mains, etc. An illustration of this general planning is given by the accompanying illustration, which is a diagrammatic layout used in planning the piping connections at pumping stations and reservoirs. The duplication of suction and discharge mains and the location of gate valves and check valves make it impossible for the failure of any one involved to put more than two pumping units out of commission, or for the failure of any pipe or special casting to put more than one unit out of commission. Attention is called to the by-pass around the venturi meter and to the arrangements of the altitude valve on the line supplying the reservoir.

*(To be continued)*

# THE MUNICIPAL INDEX

## In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading ones published in other countries, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief object in this is to keep our readers in touch with all the current literature on municipal matters. In addition to the titles, where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article. Also the name and the place of publication of the periodical in which it appeared.

## ROADS AND STREETS.

**Bituminous:**

Estimating for Asphalt Pavement Repairs. What notes should include. By J. O. Preston, C. E., ass't engr., Rochester Bureau of Municipal Research, Inc., Rochester, N. Y. 1200 words. Municipal and County Engineering, September, Indianapolis, Ind.

Present Day Bituminous Pavement Construction. Bituminous surfaces on old pavements; central mixing plants; inspection important; handling hot material on street. By R. Keith Compton, chairman and consulting engr., Paving Commission, Baltimore, Md. 3000 words. Engineering and Contracting, Oct. 1, Chicago.

Some Practical Points to Observe in Construction of Bituminous Pavements. By R. Keith Compton, C. E., consulting engr., Paving Commission, Baltimore. 3500 words. Municipal and County Engineering, September, Indianapolis, Ind.

Resurfacing Old Macadam and Gravel Roadways with Special Reference to Adaptability of Old Roadbeds as Foundation for Hot Mix Bituminous Surfaces. By H. W. Skidmore, Chicago Paving Laboratory, Chicago, Ill. 12 ills., 5500 words. Municipal and County Engineering, September, Indianapolis, Ind.

New Stone and Gravel Roads, Insured by Surface Treatment. By F. H. Gilpin, engr., Asphalt Sales Dept., The Texas Co. 1100 words. Canadian Engineer, Sept. 4, Toronto, Ont.

Bituminous Treatment of Private Roads. Owners of large farms applied to Bureau of Public Roads for advice regarding application of bituminous material on much-traveled farm lanes. 350 words. Municipal Journal and Public Works, Sept. 27, New York.

**Concrete:**

Methods of Protecting Concrete Pavements Laid in Warm Weather. Canvas covering; curing by ponding, earth covering, and sprinkling. 2 illus., 1100 words. Engineering and Contracting, Sept. 3, Chicago.

New Features in Indiana's Concrete Road Specifications. Recent draft includes some of the latest ideas in highway work; materials and methods covered in detail. 2000 words. Engineering News-Record, Sept. 25, New York.

Does Rich Concrete in Roads Crack More Than Lean? Answers to questionnaire sent to engineers prominent in use of road concrete. Answers by J. C. Pearson, U. S. Bureau of Standords; Wm. D. Uhler, chief engr., Pa. State Highway Dept.; E. N. Hines, chairman, Board of Wayne county, Mich.; P. St. James Wilson, acting director, U. S. Bureau of Public Roads; A. N. Johnson, consulting highway engr., Portland Cement Ass'n; Clifford Older, chief state highway engr., Illinois; Duff A. Abrams, Lewis Institute, Chicago; A. H. Hinkle, deputy state highway commissioner, Bureau of Maintenance and Repair, Columbus, O. 3500 words. Engineering News-Record, Sept. 11, New York.

70.4 Lin. Ft. of Concrete Road Per Hour. 4 ills., 600 words. Engineering and Sontracting, Oct. 1, Chicago.

**Other Kinds:**

How to Secure Best Results in Construction of Improved Granite Block Pavements. Standard sizes of blocks; concrete base, sand or mortar cushion; cement grout; protection in freezing weather; methods of mixing; salvage in old granite blocks; napping second-hand blocks. 5000 words. Engineering and Contracting, Oct. 1, Chicago.

Experience with Granite Block Pavements in New Orleans, La. By J. C. Bartley, Sewer and Water Board bldg., New Orleans. 4300 words. Municipal and County Engineering, September, Indianapolis, Ind.

Surfacing Old Granite Block Pavement. Method employed in Jersey City, using asphalt, screenings and sand. By C. E. Murphy, Asphalt Sales Dept., Texas Co. 800 words. Municipal Journal and Public Works, Sept. 20, New York.

Corrugated Spacer Used for Wood-Block Pavements. Simple cardboard device spaces blocks, provides for expansion and stops bleeding; method of laying changed. By J. S. Crandell, engr., Barrett Co., N. Y. C. 2 ills., 900 words. Engineering News-Record, Sept. 4, New York.

Resurfacing Old Brick Pavement. One 23-years old in White Plains, N. Y., being covered with two inches of bitulithic; method of preparing old pavement for new surface; handling traffic during construction. 3 ills., 1400 words. Municipal Journal and Public Works, Sept. 27, New York.

Some Things Learned in Construction of Sand Clay Roads. Misuse of type; steep crown is ruinous. By W. S. Keller, state hwy. engr., Montgomery, Ala. 1000 words. Municipal and County Engineering, September, Indianapolis, Ind.

Methods of Resurfacing Old Macadam. Most general and perplexing problem met with by highway engineers in Central Kentucky. From paper at Road Builders' Week of University of Kentucky, by Wm. N. Bosler, div. engr., Dept. of Public Roads, Frankfort, Ky. 1500 words. Engineering and Contracting, Sept. 3, Chicago.

Recommended Proceedure in Construction of New Macadam Roads. By M. D. Ross, div. engr., dept. of pub. roads, Newport, Ky. 3200 words. Municipal and County Engineering, September, Indianapolis, Ind.

**Financial:**

Raising Funds to Pay for Roads. Those who use roads should pay for them; three methods of meeting cost. Py J. I. Blakelee, 4th ass't postmaster gen., Washington, D. C., from address at Highway Traffic Ass'n of New York. 1600 words. Municipal and County Engineering, September, Indianapolis, Ind.

Pennsylvania Townships Receive Arrears in Road Aid. 150 words. Municipal Journal and Public Works, Sept. 27, New York.

Contractors' Bonds for New York Highway work. Highway law amended by state legislature. 700 words. Municipal Journal and Public Works, Sept. 27, New York.

Good Roads. Bad road tax is more than good road tax; greater part of money left in county; engineers in road work. By Rodman Wiley, commissioner of public roads, Ky. 2 ills., 2800 words. Southern Good Roads, September, Lexington, N C.

Who Should Pay for Our Highways and Why? Ideal method of charging for use of road would be one involving fixed annual charge per vehicle plus mileage charge. 800 words. Engineering and Contracting, Sept. 3, Chicago.

Cost of Surveys for Federal Aid Roads Project in Kansas. 1200 words. Engineering and Contracting, Sept. 3, Chicago.

What Has New York State Received for Its $100,000,000 Highway Expenditures? Analysis of work done during 21-year period, 1898-1919, shows economic fallacy of increasing mileage with nondurable types of construction involving high maintenance costs. By H. Eltinge Breed, engr., N. Y. C., formerly first deputy commissioner of highways, N. Y. S. 5500 words. Engineering News-Record, Sept. 4, New York.

Two Years' Record of Maintenance Costs of Primary Roads in Washington. 1 table, 1000 words. Engineering and Contracting Oct. 1, Chicago.

Effect of War on Paving Operations in Baltimore. Tabulation of accepted bid prices for 1916, 1917 and 1918. By G. E. Finck, ass't engr., paving commission, Baltimore, Md. 1 table, 1600 words. American City, September, New York.

**Maintenance:**

Maintenance of Macadam and Gravel Roads. From paper at Road Builders' Week of University of Kentucky, by R. C. Heath, road engr., Kentucky State Dept. of Public Roads. 1700 words. Engineering and Contracting, Sept. 3, Chicago.

Comparative Cost of Maintaining Roads with Tractor Outfit and Eight-Mule Outfit. By N. C. Hughes, Jr., highway engr., Laurens, S. C. 1 lil., 300 words. Municipal and County Engineering, September, Indianapolis, Ind.

Highway Maintenance in Wisconsin. Gang maintenance continued; surface treatment of stone and gravel macadam roads; preparation of surface; application of bitumen; treatment of bituminous macadam; concrete roads. From "Highway Maintenance," Wisconsin Highway Commission. 1300 words. Good Roads, Sept. 24, New York.

Highway Maintenance in Wisconsin. Upkeep of surfaced roads; surface treated and untreated macadam; bituminous macadam roads; cold patching methods; concrete roads; bridges; markers and signs. From "Highway Maintenance," Wisconsin Highway Commission. 1800 words. Good Roads, Sept. 10. New York.

Highway Maintenance in Wisconsin. Gang maintenance; heavy grading work; equipment and methods; resurfacing stone and gravel roads; bonding. From "Highway Maintenance," Wisconsin Highway Commission. 4 ills., 2500 words. Good Roads, Sept. 17, New York.

Highway Maintenance in Wisconsin. Upkeep of surfaced roads; methods employed for highways; of shale, pit run gravel or crushed and screened gravel. From "Highway Maintenance," Wisconsin Highway Commission. 1500 words. Good Roads, Sept. 3, New York.

**Engineers:**

Highway Engineers and Educating Them. Letter from Commissioner of Education to professors of universities and deans of colleges. 300 words. Municipal Journal and Public Works, Sept. 20, New York.

Proposed Schedule of Salaries for Engineers in State Highway Service. 1500 words. Engineering and Contracting, Oct. 1, Chicago.

Fellowships in Highway Engineering. Information furnished by A. Blanchard, Professor of Highway Engineering at University of Michigan. 300 words. Municipal Journal and Public Works, Sept. 27, New York.

Duties of the County Highway Engineer-Manager. Essential points for securing greatest efficiency; Mecosta county plan of co-operative road building. Abstract of paper before Michigan Engrg. Society, by E. E. Sours, county engr., Mecosta co., Mich. 2200 words. Engineering and Contracting, Sept. 3, Chicago.

**Construction:**

Some Lessons and Problems. Paving experiences; use of machinery; problems in mechanical loading; improved road surfaces; economies in material. Paper before Institution of Municipal and County Engineers. Hull, England. 2500 words. Canadian Engineer, Sept. 25, Toronto, Ont.

Cantonment Road Building at Camp Lewis. Methods and costs of building about 22 miles of gravel road and over 150,000 square yards of warrenite-bitulithic—with local gravel aggregate, on bituminous concrete foundation. By U. S. Marshall, senior hwy. engr., Bureau of Public Roads, U. S. Dept. of Agriculture. 6 ills., 2 maps, 2800 words, Sept. 3, 9 ills., 1800 words, Sept. 10. Good Roads, New York.

Large Portable Road Crushers. Built for use of A. E. F. in road construction work in France. By R. R. Shafter, engr., Traylor Engrg. & Mfg. Co., Allentown, Pa. 1 ill., 300 words. Canadian Engineer, Sept. 4, Toronto, Ont.

Progressive Method of Road Improvement for Rural Districts. Economic features of permanent work; drainage and under-drainage; foundation one of most important features; temporary top courses. From paper before Canadian Road Congress, by G. Henry, chief engr., Dept. of Roads, Quebec. 5000 words. Engineering and Contracting, Sept. 3, Chicago.

Pneumatic Tools for Breaking Up Pavement. By using special points a tie-tamping machine may be used for cutting blocks and breaking up pavement. By W. P. Burn, M. E. Ingersoll-Rand Co. 7 ills., 1200 words. Electrical Railway Journal, Sept. 20, New York.

**Contracts:**

Little Rock-Hot Springs Highway Contract. Bulletin of Associated General Contractors contains letter from secretary givin publicity to contract let by Board of Commissioners to a firm that had not bid formally at all. 300 words. Municipal Journal and Public Works, Sept. 13, New York.

Should Contracts for Grading Upon Extensive Highway Improvements Be Awarded Separately? 2000 words. Engineering and Contracting, Oct. 1, Chicago.

**Miscellaneous:**

Road Drainage and Foundations. Earth loses sustaining power; side drainage for all country roads essential; soil determines foundation depth; field stone and telford. By G. Hogarth, chief engr., Ontario dept. of highways. Paper before Canadian Good Roads Ass'n. 2000 words. Canadian Engineer, Sept. 11, Toronto, Ont.

Road Drainage and Foundations. Some points of underdrainage; surface drainage; classes of foundations. By G. Hogarth. chief engr., Department of Highways. 2000 words. Engineering and Contracting, Oct. 1, Chicago.

Effect of Impact of Trucks. Tests being made by Bureau of Public Roads; apparatus used and test conditions; results obtained thus far. 7 ills., 1500 words. Municipal Journal and Public Works, Sept. 13, New York.

Impact Tests of Auto Trucks on Roads. From preliminary report by E. B. Smith, senior ass't testing engr., and J. T. Pauls, highway engr., concerning experiments being conducted by Bureau of Public Roads at Arlington Experimental Farm. 3 ills., 1500 words. Engineering and Contracting, Oct. 1, Chicago.

Motor-Truck Impact on Roads Five Times Dead Load. Experiments of Bureau of Public Roads indicate that force is dependent on speed, power and condition of truck. 3 ills., 1100 words. Engineering News-Record, Sept. 18, New York.

Highways to Lower the High Cost of Living. By J. S. Beall, pres., Armco Iron Culvert and Flume Manufacturers' Ass'n. 1200 words. Engineering and Contracting, Oct. 1, Chicago.

The Need of the Nation. National system of roads, constructed, maintained, and paid for by the Federal Government. By M. O. Eldridge, dir. of roads, American Automobile Ass'n. From address at meeting of N.C. Good Roads Ass'n. 1500 words. Southern Good Roads, September, Lexington, N.C.

Good Roads. Advantages; their cost less than that of bad roads; money spent for roads kept at home; value of farms increased by good roads; should employ engineers. Address at Williamsburgh, Ky., by R. Wiley, commissioner of public roads, Ky. 2500 words. Good Roads, Sept. 10, New York.

Highways to Lower High Cost of Living. Trucks compete with railroads; municipal markets; saves middleman's profits. By J. S. Beall, pres., Armco Iron Culvert & Flume Mfrs'. Ass'n. 1200 words. Canadian Engineer, Sept. 25, Toronto, Ont.

Good Roads. Value of diagonal highway in proper location; secondary city streets; four principles for proper construction; foundations; pavement history; what is the best pavement? maintenance; the future good road. By C. F. Puff, Jr., ass't. chief engr., Bureau of Highways. Luncheon address at Engineers' Club of Philadelphia. 3 ills., 4300 words. Journal of Engineers' Club of Philadelphia, September, Philadelphia.

Mountain Highways at Hamilton, Ont. Report submitted by N. Cauchon, of Ottawa, plans access to Stadium and park development with ruling grade of 3%. 2500 words. Canadian Engineer, Oct. 16, Toronto, Ont.

Street Classification as an Aid to Pavement Design. Practicability of such classification; relation between character and density of traffic and thickness of foundation; opinions of number of prominent municipal engineers. By J. W. Routh, director, Bureau of Municipal Research, Rochester, N.Y. 1600 words. Municipal Journal and Public Works, Sept. 6, New York.

Classification of Highways. Advantages of improved roads; necessity for classification of country's highways; description of the several classes and estimates of cost of improvement and service rendered. By H. G. Shirley, secy., Federal Highway Council, from paper before N.C. Good Roads Ass'n. 2 ills., 2300 words. Good Roads, Sept. 24, New York.

Another Meadows Highway. Will probably be constructed in meadow land between Newark and Jersey City to relieve congestion on Lincoln highway. 800 words. Municipal Journal and Public Works, Sept. 20, New York.

Instructions of Arizona State Highway Department for Guidance of Its Engineers. 3200 words. Engineering and Contracting, Sept. 3, Chicago.

Should "The Absolute Ton-Mile" Be Discarded for "The Commercial Ton-Mile?" New term advocated by "The Commercial Vehicle." 700 words. Engineering and Contracting, Sept. 3, Chicago.

Highways Transport Committee Discontinued. Established by U. S. Council of National Defense as necessary adjunct to war-time activities. 200 words. Municipal Journal and Public Works, Sept. 27, New York.

The Service Man and Public Roads. Resumption of road building as oportunity for returned soldier; government encouragement of projected improvements; success of campaign to place soldiers. By Col. Arthur Woods, ass't to Secy. of War. 900 words. Good Roads, Sept. 17, New York.

A $17,000,000,000 Road Improvement Program. Highways Industries Ass'n estimates it will be necessary to expend that amount in next 10 to 15 years. 500 words. Engineering and Contracting, Sept. 3, Chicago.

American Views for French Highways. Expressed by committee of American Engineering Societies in response to conclusions submitted by French engineers for its consideration. 3000 words. Municipal Journal and Public Works, Sept. 20, New York.

Proceedings of Annual Meeting North Carolina Good Roads Association. By Miss H. M. Berry, acting secy., 5 ills., 6300 words. Southern Good Roads, September, Lexington, N. C.

## SEWERAGE AND SANITATION.

**Sewage Treatment:**

Operating Experiences with Activated Sludge Process for Factory Wastes. Activation of outside material; combustion of organic matter; final sedimentation; quality of effluent. By G. W. Fuller, cons. engr., 170 Broadway, N. Y. C. 2800 words. Municipal and County Engineering, September, Indianapolis, Ind.

A Sewage Treatment Experiment. Being conducted at Mt. Vernon sewage treatment plant on modified activated sludge process and a new drum screen. 1300 words. Municipal Journal and Public Works, Sept. 27, New York.

Electrolytic Sewage Treatment. Investigation of Easton plant by committee of Franklin Institute; chemical and bacterial effect of treatment; cost of treatment. 1600 words. Municipal Journal and Public Works, Sept. 6, New York.

Tests of Lime-Electrolytic-Agitation Sewage-Treatment Process at Easton, Pa. Landreth "direct-oxidation" system studied by engineering division of Pennsylvania State Dept. of Health and for committee of the Franklin Institute. 1 ill., 4500 words. Engineering News-Record, Sept. 18, New York.

Electrolytic Sewage Treatment Not Yet an Established Process. Editorial reference to direct-oxidation process in demonstration plant at Easton, Pa. 2000 words. Engineering News-Record, Sept. 18, New York.

Sewage-Disposal Difficulties at Madison, Wis. Sludge handling improved by hoppers and new pipe connections for flat-bottom tanks; history of plant. 1 ill., 2400 words. Engineering News-Record, Sept. 11, New York.

Investigation of Odors from Lake at Madison, Wis. Sewage plant gets popular blame, but study will include algae, trade wastes and surface and street drainage. 1000 words. Engineering News-Record, Sept. 4, New York.

Sewage Treatment at English Military Camps. Some interesting information presented by G. P. Kenshaw, consulting engr. of London, on his experiences in sewage disposal in British camps. 1000 words. Enginering and Contracting, Sept. 10, Chicago.

Utilization of Sewage Sludge in Birmingham, England. Shallow tanks and thoro digestion furnish sludge without odor and with great possibilities as an organic fertilizer. 4 ills., 1500 words. American City, September, New York.

Progress in Sewage Purification at City and County of Canterbury Since 1868. Paper before Ass'n of Managers of Sewage Disposal Works at Canterbury, England, by C. Terry, sewage disposal works mgr. 1000 words. Municipal Engineering and Snitay Record, Aug. 21, London, Eng.

Sewerage Works of Stratford, Conn. Invert of sewer at plant is three feet below high tide and three feet above low tide; effluent held in tidal chamber during flood tide; Imhoff tanks and chlorination. By Clyde Potts, M.Am.C.E. 2 ills., 1600 words. Municipal Journal and Public Works, Sept. 13, New York.

The Sewage Disposal System. Description of Albany's intercepting sewer and sewage disposal plant, begun in 1915 and now completed and in operation. By F. R. Lanagan, city engr. 1400 words. Fire and Water Engineering, Sept. 24, New York.

Sewage Disposal of Chicago. New projects and methods will be needed before completion of present projects, because of city's growth and conditions; lack of appreciation by general public of seriousness of situation. By C. D. Hill, engr., construction bureau, Chicago. 3000 words. Engineering World, Sept. 1, Chicago.

**Construction:**

Trench Machinery. With special attention to machinery applicable to sewer and such-like trenches. Paper before Conference of Institution of Municipal and County Engineers, by A. E. Collins, city engr., Norwich, England. Discussion. 23 ills., 6500 words. Journal of Institution of Municipal and County Engineers, Aug. 16, London, England.

Tunnelling Machines in Sewer Excavation. 2 ills., 600 words. Engineering and Contracting, Oct. 16, Chicago.

**Cost:**

Cost of Constructing Sewers and Water Mains at Montreal South, Que. 700 words. Engineering and Contracting, Oct. 8, Chicago.

Why Cities Should Issue Bonds for Sewers and Other Public Works Rather Than "Pay as They Go." Editorial. 800 words. Engineering and Contracting, Sept. 10, Chicago.

**Traps:**

Advocacy for Abandonment of the Intercepting Trap. Editorial. 500 words. Municipal Engineering and Sanitary Record, Sept. 11, London, England.

## WATER SUPPLY

**Dams and Reservoirs:**

Plans for Earth Dam Construction Involve Large Use of Machinery. Designs for structure 100 feet high at Providence, R. I., completed and specifications well advanced. By F. E. Winsor, chief engr., Water Supply Board, Providence, R. I. 1000 words. Engineering News-Record, Sept. 25, New York.

The Gilboa Dam. New structure will double Catskill water supply for New York City. By H. Gardner. 5 ills., 3300 words. Engineering World, Sept. 15, Chicago.

Fundamentals in Design of Multiple-Arch Dam. Applicability and restrictions of this type of structure and principles controlling its design; illustrated by New Lake Eleanor dam for San Francisco water supply. By R. P. McIntosh, hydraulic engr., San Francisco. 5 ills., 4500 words. Engineering News-Record, Sept. 4, New York.

New Concrete Dam of the Oklahoma City Water-Supply. Work begun in February, 1917, now practically complete. 1 ill., 300 words. American City, September, New York.

Groined Arches or Flat Roof for Concrete Reservoirs. Several engineers and builders give opinions as to relative economy and safety, based on experience with both types through a number of years. 3000 words. Engineering News-Record, Sept. 18, New York.

Construction Features of Grand River Roller Crest Dam. Most notable feature is roller crest by which entire upper 10 feet of dam can be lifted above high water. 1 ill., 2000 words. Engineering and Contracting, Sept. 10, Chicago. 1 ill., 3000 words. Engineering World, Sept. 1, Chicago.

Dam and Tunnel Construction by the Marin Water District. Gravity type dam; siphon spillway of dam; labor costs of Pine mountain tunnel. Described by H. M. Bowers, ass't engr., in recent issues of Journal of Electricity, 2 ills., 1000 words. Engineering and Contracting, Sept. 10, Chicago.

The Silting Up of Reservoirs. Silt deposits from southwestern streams; quantity of silt carried by stream; remedial measures for silting. 2800 words. Engineering and Contracting, Sept. 10, Chicago.

10,000,000 Gallon Reservoir at Dayton, O. Described by L. Metcalf and W. T. Barnes, of Boston, Mass., in paper before New England Water Works Ass'n. 600

words. Canadian Engineer, Oct. 9, Toronto, Ont.

Methods of Constructing Hydraulic Fill Dams of Miami Conservancy District. 1 ill., 5,500 words. Engineering and Contracting, Oct. 15, Chicago.

### Pumping

Pumping Plants for Small Water Works. Comparative costs for different types. From Journal of New England Water Works Association, by H. A. Symonds. 2000 words. Engineering and Contracting, Oct. 8, Chicago.

Building Up a Worn Pump with the Oxy-Acetylene Process. By C. C. Phelps, engrg. dept., Oxweld Acetylene Co., N. Y. C. 1 ill., 800 words. Municipal and County Engineering, September, Indianapolis, Ind.

Pumps for Small Water Works. Table of comparative fuel and first costs of various types of pumping plants. 2300 words. Canadian Engineer, Sept. 11, Toronto, Ont.

Reconstruction of Water Works at Cobourg, Ont. Four electrically-driven pumping units, each 750 G. P. M. capacity, on domestic service; gasoline-engine-driven unit replaces steam as standby; three mechanical filter tanks operating under normal conditions at double rated capacity. By A. E. Davison, municipal engr., Hydro-Electric Commission of Ontario. 3 ills., 1300 words. Canadian Engineer, Sept. 11, Toronto, Ont.

Air Lift for Deep Wells. Development and improvement of a simple method of pumping. By J. Oliphant. 4 ills., 2000 words. American City, September, New York.

Test Shows Over 82 Per Cent Efficiency of Motor-Driven Centrifugal Pump. 3 ills., 800 words. Engineering and Contracting, Sept. 10, Chicago.

Pumping Water for Irrigation Makes Important Power Load. Hundreds of orchards in Washington watered by pumping plants supplied by hydro-electric power; types of pumps used. By W. A. Scott. 900 words. Electrical Review, Sept. 27, Chicago.

Test Shows 82.1% Over-All Efficiency of Motor-Driven Centrifugal Pump. By R. N. Austin, mgr., Turbine Equipment Co., Ltd., Toronto. 4 ills., 1000 words. Canadian Engineer, Oct. 2, Toronto, Ontario.

### Meters and Rates:

Metering Renders Additional Water Supply Unnecessary. Master meter and consumers' meters installed at Middletown, Conn., are followed by a material reduction in consumption. 1000 words. Engineering News-Record, Sept. 25, New York.

Meter Maintenance. Cost of repairing and maintaining meters in American cities; intervals at which meters are tested and methods of testing; repairs which are made by water works employes. 2¼ pages tables, 100 words. Municipal Journal and Public Works, Sept. 13, New York.

Venturi Meters at Baltimore. Experience both extensive and interesting; some notable installations described and illustrated; reversible flow Venturi meter. 5 ills., 600 words. Fire and Water Engineering, Sept. 24, New York.

Meters. Data supplementary to those published in June 7th issue; number, reading and billing in different cities. 3 pages tables. Municipal Journal and Public Works, Sept. 6, New York.

Methods Used and Results Obtained in Metering the Water Supply of Terre Haute, Ind. By Dow R. Gwinn, pres. and mgr., Terre Haute Water Works Co. 5 ills., 4000 words. Municipal and County Engineering, September, Indianapolis, Ind.

Computation of the Coefficient of Discharge of Venturi Meters. Tests at University of Pennsylvania indicate that coefficients may be computed within 0.5% of experimental values. By W. S. Pardoe, ass't prof. of civ. engrg., University of Pennsylvania. 6 charts, 2 tables, 1000 words. Engineering News-Record, Sept. 25, New York.

Flat Rates vs. Meter Rates. Superintendent of water works of Tuscaloosa, Ala., finds flat rate system unjust to consumer; comparison of statistics. 500 words. Engineering and Contracting, Sept. 10, Chicago.

Waste Water Control. Successful results in Trenton and Buffalo; selective metering; table showing per capita in some larger cities in Great Britain. By E. D. Case, gen. mgr., the Pitometer Co., N. Y. C. Paper before Southwestern Water Works Ass'n. 2500 words. Engineering World, Sept. 1, Chicago.

Water Waste Control by House Inspections with District Metering. 900 words. Engineering and Contracting, Sept. 10, Chicago.

Philadelphia's Fight Against Water Waste. First of a series of articles telling story of successful campaign on broad line; water waste division organized; house-to-house inspection and pitometer night surveys; mapping the gridiron. By Wm. M. Crowe, ass't engr., Philadelphia bureau of water. 5 ills., 1700 words. Fire and Water Engineering, Sept. 24, New York.

### Financial:

Some Economies That May Be Effected in Operation and Maintenance of Water Works System. By H. V. Knouse, ass't supt. and purchg. agt., Metropolitan Water Dist., Omaha, Neb. 7 ills., 3000 words. Municipal and County Engineiering, September, Indianapolis, Ind.

Management of Municipal Water Works. Introduction of a budget system, metering and water waste surveys have increased economy of operation of the Sault Ste. Marie water works. By W. M. Rich, city manager, Sault Ste. Marie, Mich. 2500 words. American City, September, New York.

Methods of Effecting Economies in Water Works Operation. Locating leaks in pumping station operation; special rigs and methods for handling lines. By H. V. Knouse, ass't supt. and purchg. agent, Metropolitan Water Dist., Omaha, Neb. 2000 words. Engineering and Contracting, Oct. 8, Chicago.

Cost of Laying Water Pipe. Itemized costs from Rome, N. Y. and Canton, O. 200 words. Municipal Journal and Public Works, Sept. 13, New York.

### Distribution System:

Constructing a 98-Kilometer Water Conduit in Chile. Wrought-iron pipe for Toconce line carted and dollied and supplies moved by carts and pack mules through mountainous desert; much pipe laid by machine; camp and conduit costs. By G. H. Bayles, ass't resident engr. in charge of constr.; now at Morgantown, W. Va. 10 ills., 5000 words. Engineering News-Record, Sept. 25, New York.

Diagram for Computing Band Spacing for Wood-Stave Pipe, for pipe 1 to 20 in diameter, under heads of from 10 to 200 feet and for band diameters of 3/8 to 1¼ inches. By W. T. Batcheller, engr., Municipal Light and Power System, Seattle, Wash. 1 ill., 500 words. Engineering News-Record, Sept. 4, New York.

Unusual Damage Caused by Break. Split in 48-inch Catskill main in Brooklyn does great damage to adjacent property; unusual amount of earth moved by escaping water; cause and effect of break; method of repair adopted. By Wm. W. Brush, deputy chief engr., Dept. of Water Supply, Gas and Electricity. 5 ills., 2200 words. Fire and Water Engineering, Sept. 24, New York.

Backfilling the Red River Tunnel. Concrete poured around 60-inch cast-iron pipe in 10x10-foot rock bore by dropping it 70 feet from trestle across river. By J. Armstrong, div. engr., Greater Winnipeg Water Dist., Winnipeg, Man. 2 ills., 1300 words. Canadian Enigneer, Oct. 9, Toronto, Ont.

### Purification:

Operation of Drifting Sand Filters at Toronto. Average reduction of 85.4% in total bacterita and of 94.8% in B. Coli during 1918; chlorination killed practically all remaining bacteria; more coagulant needed in summer than in winter; water undergoes two distinct changes during year. By N. J. Howard, bacteriologist-in-charge, filtration plant laboratory, Toronto. 3 ills., 4 tables, 5000 words. Canadian Engineer, Oct. 2, Toronto, Ont.

Notes on Filtration Plant Operations at St. Louis. Coating of sand grains; holes in filter sand made by fish; screening filter units; locating loose strainer plates. Abstract of report by A. G. Nolte, supt. of plant. 1900 words. Engineering and Contracting, Oct. 8, Chicago.

Legal Responsibility for a Pure Water Supply. By J. Wilson, consulting engr., Duluth, Minn., who was closely associated with litigation following typhoid epidemic in Mankato, Minn., in 1908. 2300 words. American City, September, New York.

Protecting New York's Water Supply. All water treated with liquid chlorine; practically all surface water; chlorine recognized as cheapest form of municipal health insurance; method of application. By Wm. J. Orchard, sanitary engr., Wallace & Tiernan Co., N. Y. C. 1 ill., 1200 words. Fire and Water Engineering, Sept. 24, New York.

Operation of Slow Sand Filters at Toronto. 10,000 samples tested during 1918 show 99.7% average reduction in B. Coli, 99.1% in total bacteria, and 99% in excremental bacteria; pollution of raw water increased 61.9% in five years judged by B. coli tests. By N. J. Howard, bacteriologist-in-charge, Filtration Plant laboratory, Toronto. 8 tables, 2300 words. Canadian Engineer, Sept. 18, Toronto, Ont.

New Water Filtration Plant of Whiting, Ind. Testing station operated for obtaining solution of certain problems; results well justified expense. By R. S. Rankin, engr. with Pearse & Greeley, Chicago. 4 ills., 2000 words. Engineering & Contracting, Sept. 10, Chicago.

Result of First Year's Operation of Point St. Charles Filtration Works, Montreal. 900 words. Engineering and Contracting, Sept. 10, Chicago.

Chlorination and Health of Communities. Interesting chart showing relation of chlorination of water supplies to lessening of typhoid caused by pollution. 1 chart, 300 words. Fire and Water Engineering, Sept. 3, New York.

Drifting Sand Filtration System of Toronto. Coagulation plant; pumping station; filters; loss of head; sand scour; turbidity. 4 ills., 27000 words. Engineering, Oct. 8, Chicago.

### Run-off:

Watershed Run-Off in Ontario. Results of stream flow and rainfall measurements at 48 stations during 1918; inches on watershed and percentage of rainfall. 900 words. Municipal Journal and Public Works, Sept. 27, New York.

Stream Flow and Percolation Water. Percolation and hydraulic laws; subsoil storage reservoirs; hydraulic similarity; basic curve and percolation discharge. By S. Hall, ass't water engr., Belfast. Paper before Institution of Water Engrs. of Great Britain. 4 charts, 4300 words. 2300 words, Sept. 18. Canadian Engineer, Toronto, Ont.

Method of Constructing a Diagram to Show Probable Droughts. Illustrated by study of rainfall during 10-day periods, or decades of days, for 32 years, at Kherson, European Russia. By V. V. Tchikoff, consulting civ. engr., Berkeley, Cal. 1 ill., 1000 words. Engineering News-Record, Sept. 18, New York.

### Fire Protection

Water Departments and Private Fire Lines. Proper regulations governing private fire protection lines; suggestions for compensation; contamination of water supply; references to court decisions. Excerpts from paper before Indiana Sanitary and Water Supply Ass'n., by D. R. Gwinn, Terre Haute, Ind. 2700 words. Canadian Engineer, Sept. 25, Toronto, Ont.

Planning of Water Works for Fire Protection. Analysis of relationship of various items entering into this important service. By H. M. Blomquist, principal ass't engr., Bureau of Water, St. Paul, Minn. 3500 words. American City, September, New York.

San Francisco's Auxiliary System. High pressure water supply for fire protection; one high pressure hydrant gives more water than three fire engines; fire cisterns as reserve in case hydrants are not available. By F. M. Hyde, ass't mechanical engr. 7 ills., 2000 words. Fire and Water Engineering, Sept. 3, New York.

### Miscellaneous:

Pressures in Penstocks Caused By the Gradual Closing of Turbine Gates. By E. Halmos, designing engr., Barclay Parsons & Klapp, N.Y. 2500 words. Canadian Engineer, Sept. 25, Toronto, Ont.

Pressure Rise Caused by Gradual Gate Closure. Application of Prof. Joukovsky's theory of maximum water-hammer; solution of problem by arithmetic integration; derivation of formulas; paper presented to American Society of Civil Engrs., by N. R. Gibson, hydraulic engr., Hydraulic Power Co., Niagara Falls. 2 charts, 3 tables, 5000 words., Sept. 4, 7 charts, 3000 words Sept. 11. Canadian Engineer, Toronto, Ont.

Tests of Paints for Interior Surface of Iron Standpipes. Summarized in paper prepared by C. W. Sherman, of Metcalf & Eddy, Boston, and presented at New England Water Works Association. 900 words. Engineering and Contracting, Oct. 8, Chicago.

Protecting Iron and Steel Standpipes from Corrosion. Data summarized in paper presented by C. W. Sherman, of Metcalf & Eddy, Boston, and presented at New England Water Works Association. 1100 words. Canadian Engineer, Oct. 9, Toronto, Ont.

The Ipswich River Water Supply for city of Lynn, Mass. By H. K. Barrows, cons. engr., 6 Beacon st., Boston. 4 ills., 1600 words. Municipal and County Engineering, September, Indianapolis, Ind.

Three Million for Columbus' Water Works. 100 words. Municipal Journal and Public Works, Sept. 13, New York.

Suggested Improvements for Water

Works of Fort Wayne, Ind. Abstract of report of Natl. Board of Fire Underwriters' Committee on Fire Prevention and Engineering Standards. 1200 words. Engineering and Contracting, Oct. 8, Chicago.

Reconstructing Madison's Water Works. New pumping station and larger plant built on site of old without interrupting service; new reservoir and air lift. 1500 words. Municipal Journal and Public Works, Sept. 13, New York.

New Well Supply at Minot, N. Dak. Investigation of sources and possible means of securing larger and better supply begun under direction of F. Bass, consulting engr. Abstract of paper by A. Hunt in Bulletin of Affiliated Engrg. Societies of Minnesota. 1100 words. Engineering and Contracting, Sept. 10, Chicago.

Relation Between Water Supply and Goiter. Traced by Mayo Tolman, chief engineer, W. Va. State Department of Health, in American Journal of Public Health. 600 words. Engineering News-Record, Sept. 11, New York.

Root, 24 feet long, taken from 10-inch Water Main at Lakeville, N. Y. 1 ill., 400 words. Engineering and Contracting, Sept. 10, Chicago.

Baton Rouge Water Supply. Unusual ground water conditions in Louisiana city; wells drilled by rotary process; no rock encountered; apparent connection between river and sand strata; 2000 feet greatest depth. By L. R. Howson, of Alvord & Burdick, Chicago, Ill. 3 ills., 2000 words. Fire and Water Engineering, Sept. 17, New York.

Water Works and Electric Plant of Kansas City, Kans. Modern equipment properly operated and supervised insures economy. By H. C. Chapman, water and light commissioner, Kansas City. 3 ills., 1300 words. American City, September, New York.

Water Works of Alabany. 90 per cent of supply from Hudson river; purification by sedimentation, rapid and slow filtration and chlorine treatment; the distribution system; history of water works. By W. Greenalch, commissioner of public works, Albany. 2 ills., 2000 words. Fire and Water Engineering, Sept. 24, New York.

Some New York State Water Works. Water supply of Hudson; Saratoga's water and sewage disposal system; Poughkeepsie's department self-sustaining; four reservoirs in Glens Falls water works. 5 ils., 3300 words. Fire and Water Engineering, Sept. 24, New York.

Albany Water Works a Hundred Years and More Ago. Private company formed in 1800 based first rates on number of fireplaces, but soon changed; pipe priced at $100 a ton. 1200 words. Engineering News-Record, Sept. 25, New York.

Some Results of Supervision of Public Water Supplies by N. Y. State Department of Health. By T. Horton. chf. engr., Div. of Sanitary Engrg., N. Y. State Dept. of Health, from paper before the New England Water Works Association. 1 ill., 1300 words. Engineering and Contracting, Oct. 8, Chicago.

The Managerial Law of Inspection and Constructive Criticism, with Special Reference to Water Works. By H. P. Gillette, editor, 1000 words. Engineering and Contracting, Oct. 8, Chicago.

Lack of Foresight in Municipal Water Supplies. Planning for future and even provision for current needs are safeguards against emergencies often neglected. By Morris Knowles, consulting engr., Pittsburgh, Pa. 600 words. Engineering News-Record, Sept. 25, New York.

Points to Be Considered in Reconstruction of Small Water Power Plants. Effect of raising pond on backwater situation; selection of turbine. 4700 words. Engineering and Contracting, Sept. 10, Chicago.

Schoharie Development of Catskill Water Supply System of New York City. The Gilboa dam; the Shandaken tunnel. Abstract of paper before New England Water Works Ass'n., by J. Waldo Smith, chief engr., Board of Water Supply, N. Y. C. 6 ills., 2800 words. Engineering and Contracting, Oct. 8, Chicago.

The New England Water Works Association. 38th annual convention to be held in Albany; plans maturing for very successful meeting; program as arranged to date. 102 ills., 2400 words. Fire and Water Engineering, Sept. 24, New York.

## LIGHTING AND POWER.

### Electricity:

California Municipal Electric Plants. Financial results last year of municipal operation of such plants; municipalities taking over private plants. 1200 words. Municipal Journal and Public Works, Sept. 20, New York.

New and Extraordinary Records in Electrical Exports. Figures for June over double those of a year ago; fiscal year nearly 48% better than last. 600 words. Electrical Review, Sept. 6, Chicago.

Pennsylvania Electric Association Holds Interesting Convention. Quality of papers and exhibits notable features of successful meeting. 2 ills, 1800 words. Electrical Review, Sept. 13, Chicago.

Power-Factor Correction by Use of the Static Condenser. Characteristics of static condenser installations; causes of low power-factor; operating costs and purchase price. Paper before Pennsylvania Electric Ass'n, by O. C. Roff, General Electric Co. 8 ills., 2300 words. Electrical Review, Sept. 13. Chicago.

Delivery of High-Tension Service to Large Consumers. General considerations involved; relation of cost of equipment; metering. By R. Collier, operating and sales manager, Georgia Railway & Power Co. 2 ills., 4500 words. Electrical Review, Sept. 6, Chicago.

### Water Power

Undeveloped Water Powers of New Brunswick. List of possible sites totals 23,000 H. P. (24-hour power), not including the grand falls of St. John and Nepisguit rivers; paper read at Engineering Institute's professional meeting. By C. O. Foss, chairman, N. B. Water Powers Commission. 1700 words. Canadian Engineer, Sept. 18, Toronto, Ont.

Reconstruction of Small Water Power Plants. Application of known data; factors influencing head: effect of raising pond; pulling down pond; selection of turbine. From paper before Michigan Engfg. Society, by R. K. Holland, Ann Arbor, Mich. 3,500 words. Canadian Engineer, Oct. 2, Toronto, Ont.

Hydroelectric Energy in France. Fuel supply being inadequate, France must develop her sources of "white coal" in order to meet industrial needs; America can cooperate in hydroelectric development. By C. W. Veditz, former American commercial attache at Paris and Madrid. 2500 words. Electrical Review, Sept. 13, Chicago.

### Gas

Financial Status of British Gas Undertakings. Price for gas, profits, financing and restriction discussed in capable and interesting way by one familiar with actual conditions. By N. H. Humphrys, Salisbury, Eng. 2000 words. Gas Age, Sept. 15, New York.

Temperatures in By-Product Coke Practice. From advance abstract of report to be published as Technological Paper no. 137 by U.S. Bureau of Standards. By R. S. McBridge and W. A. Selwig. 5 ills., 2300 words. GaGs Age, Sept. 15, New York.

### Miscellaneous

Proposed Tidal Power Development at Hopewell. Dams and power house at confluence of Petitcodian and Memramcock rivers; initial installation of 90,000 H. P. would cost approximately $122 per H. P. Paper at Engineering Institute's 5th professional meeting, by W. R. Turnbull, cons. engr., Rothesay, N. B. 9 ills., 7000 words. Canadian Engineer, Oct. 9, Toronto, Ont.

How to Increase Boiler-Room Efficiency. Test and Operating results; percentage of carbon dioxide as indication of boiler efficiency; efficiency loss due to impure feed water. Abstract of paper before American Boiler Mfrs.' Ass'n, by D. S. Jacobus, advisory engr., Babcock & Wilcox Co. 2000 words. Engineering and Contracting, Sept. 10, Chicago.

Central-Station Rates in Theory and Practice. 9th article—Comparison of cost-of-service and value-of-service principles in rate making; price splitting; analysis of relation between selling price and earnings. 1 ills., 3700 words, Sept. 6. 10th article—Continuation of mathematical analysis of price splitting when value-of-service principles is followed; conditions under which price reductions are desirable as regards earnings. 2 ills., 4500 words., Sept. 13. 12th article—Discussion of results of mathematical study of price splitting; comparison of different modifications of value-of-service system. Sept. 27. 1 ill., 5500 words. By H. E. Eisenmenger. Electrical Review, Chicago.

Pressures in Penstocks Caused by the Gradual Closure of Turbine Gates. With reference to discussion of N. R. Gibson's paper before American Society of Civ. Engrs. (See Sept. 4 and 11 issues of Canadian Engineer) By M. M. Warren, Stone & Webster Engrg. Corporation, Boston. Mass. 800 words. Canadian Engineer, Oct. 2, Toronto, Ont. Discussion by O. V. Kruse, hydraulic engr., Larner-Johnson Valve & Engrg. Co., Philadelphia. 2 ills., 2700 words. Canadian Engineer, Oct. 8, Toronto, Ont.

Pumping Water for Irrigation Makes Important Power Load. Hundreds of orchards in Washington watered by pumping plants supplied by hydro-electric power; types of pumps used. By A. Scott. 900 words. Electrical Review, Sept. 27, Chicago.

European Power Plant Practice. Study of European plants indicates new lines for development in this country and also shows where American engineers and manufacturers might extend operations; virtually no outdoor substations in Western Europe. By S. Q. Hayes, engrg. dept., Westinghouse Electric & Mfg. Co. 9 ills., 3500 words. Electrical World, Sept. 6, New York.

The Energy Component in Industry. Analysis of extent to which power enters into manufacturing in United States; electrification of industry is paralleled by lower unit energy costs and increased absorption of power. 9 ills., 2100 words. Electrical World, Sept. 20. New York.

## STREET CLEANING AND REFUSE DISPOSAL.

Street Cleaning and Refuse Collection in Newark. Appliances, methods and organization in a large manufacturing and commercial city; cleaning by motor flushers, machine brooms and hand; private and municipal collection; meadow dumps; pig farm. 3 ills, 1700 words. Sept. 20. Details of collection service; records of men and teams employed, amount and nature of work performed, and personal efficiency. 1 ills., 2700 words, Sept. 27, Municipal Journal and Public Works, New York.

Newark, N.J. to Dispose of Garbage by Feeding to Swine. Contract for five years awarded to the National Utilization Co. 600 words. Engineering and Contracting, Sept. 10, Chicago.

Newark Garbage-Feeding Contract. City will deliver garbage to piggery on shore of Passaic river, where it will be weighed. By J. W. Costello, engrg. supervisor, Bureau of Street Cleaning and Refuse Collection, Newark, N.J. 600 words. Engineering News-Record, Sept. 4, New York.

Profit in Garbage-Fed Hogs. Experience of Lansing, Mich., shows that proper care increases revenues. By E. C. W. Schubel, D. V. S., supt., garbage dept. and hog farm, Lansing. 2 ills., 2200 words. American City, September, New York.

Electric Trucks for Refuse Collection. Cleansing superintendent of Sheffield, England, has prepared improved scheme for collecting and disposing of house refuhe; experience with electric vehicles during last four years eminently satisfactory. 400 words. Municipal Journal and Public Works, Sept. 6, New York.

Trend in Municipal Refuse Collection and Disposal. Estimating Costs. By R. Hering, D. Sc., cons. engr., 170 Broadway, N.Y.C. 3000 words. Municipal and County Engineering, September, Indianapolis, Ind.

Disposal of Commercial Wastes. Merchant's Association of New York City has employed Prof. O. H. Landreth to study problem. 100 words. Municipal Journal and Public Works, Sept. 20, New York.

The Glasgow Cleansing Report. Petrol-driven sweeping machines compare favorably with horse-driven; electric vehicles for refuse collection more satisfactory than petrol; comparative costs given. 400 words. Municipal Engineering and Sanitary Record, Aug. 21, London, Eng.

To Prevent Street Littering. Measures taken by the Bureau of Street Cleaning in New York for keeping streets in lower east side even passably clean. 800 words. Municipal Journal and Public Works, Sept. 20, New York.

## TRAFFIC AND TRANSPORTATION.

### Traffic Regulation

Highways Transport Committee's General Traffic Regulations. Proposed regulations and suggestions for their utilization being distributed as part of committee's safety campaign. Illustration of folder. 1500 words. Good Roads, Sept. 3, New York.

Standard Highway Traffic Regulations. Proposed by Highways Transport Committee for adoption by cities and other political units throughout country. 2300 words. Municipal Journal and Public Works, Sept. 6, New York.

*(Continued on page 234)*

# NEWS OF THE SOCIETIES

**Nov. 12-14.**—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Springfield, Ill.

**Feb. 9-13, 1920.**—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention, Louisville, Ky. Secretary, E. L. Powers, 150 Nassau street, New York.

## American Society for Municipal Improvements.

The twenty-fifth annual convention will be held at New Orleans on November 11 to 14. This will be the first convention since 1916, the society having decided to omit them during the two following years because of the war. The program will be as follows:

### TUESDAY, NOVEMBER 11, 1919.

#### Morning.

9—Registration. Committee Meetings.

11—Executive Committee. Committees on Standard Specifications:

10—Bituminous Macadam and Concrete, and Asphalt Block Pavements: M. R. Sherrerd, chairman.

11—Sheet Asphalt Pavements: F. P. Smith, chairman.

12—Broken Stone and Gravel Roads: A. H. Blanchard, chairman.

10—Brick Pavements: E. H. Christ, chairman.

11—Cement-Concrete Pavements: W. A. Hansell, Jr., chairman.

12—Sidewalks and Curbs: S. Sammelman, chairman.

10—Stone Block Pavements: H. H. Smith, chairman.

11—Wood Block Pavements: E. R. Dutton, chairman.

12—Sewers: A. Potter, chairman. Foundations for Pavements: F. P. Smith, chairman, if called for by chairman.

#### Afternoon Session, 2 O'clock.

Addresses of welcome: Mayor Martin Behrman, New Orleans; W. B. Thompson, president, World's Cotton Conference, New Orleans.

Response: George H. Norton, first vice-president.

President's Address: By Elbridge R. Conant, highway engineer, Brunswick, Ga.

Report of Executive Committee.

Report of Secretary: Charles Carroll Brown, Valparaiso, Ind.

Report of Treasurer: F. J. Cellarius, Dayton, O.

Report of Finance Committee: E. S. Rankin, chairman, Newark, N. J.

Selection of Committee on Nominations, Place of Meeting and Resolutions.

Report of Committee on Public Markets: A. Prescott Folwell, chairman, New York.

"The Port of New Orleans," by J. Devereaux O'Reilly, consulting engineer, chief engineer, Board of Port Commissioners, New Orleans, La.

Report of Committee on Municipal Legislation: Norman S. Sprague, chairman, Pittsburg, Pa.

Report of Committee on Fire Prevention, Alcide Chausse, chairman, Montreal, Quebec.

#### Evening Session, 8 O'clock.

Ladies: Theatre party to attend performance of "The Better 'Ole," at the Tulane Theatre. (Meeting place, Ladies' Parlor, Grunewald Hotel.)

Gentlemen: Smoker, tendered by the Local Committee (at Grunewald Hotel).

### WEDNESDAY, NOVEMBER 12, 1919.

#### Morning Session, 9 O'clock.

Report of Committee on Water Works and Water Supply: George G. Earl, chairman, New Orleans.

"The Sewerage, Water and Drainage Systems of New Orleans," illustrated by stereopticon, by George G. Earl, general superintendent, Sewerage and Water Board, New Orleans, La.

Report of Committee on Sewerage and Sanitation: Frederick A. Dallyn, chairman, Toronto, Ont.

"Economic Values in Sewage and Sewage Sludge," by Raymond Wells, consulting chemist, Homer, N. Y.

"The Modern Grit Chamber," by George B. Gascoigne, sanitary engineer, Sub-division of Sewage Disposal, Cleveland, O.

"Brooklyn, N. Y., Sewage Treatment Station; a Brief Review of Five Years' Work," by George T. Hammond, Surgeon (Reserve) U. S. Public Health Service, Brooklyn, N. Y.

"Garbage Disposal and Economic Recovery of Valuable Constituents of Municipal Waste," by Samuel A. Greeley, Pearse and Greeley, consulting engineers, Chicago, Ill. Illustrated by stereopticon.

Discussion by Alfred F. Raymond, Member of Special Committee to Study Garbage Collection and Disposal, New Orleans; by L. L. Tribus, Tribus and Massa, consulting engineers, New York; by Raymond Wells, consulting chemist, Homer, N. Y.

Report of Committee on Street Cleaning, Refuse Disposal and Snow Removal: George H. Norton, chairman, Buffalo, N. Y.

#### Afternoon, 12 O'clock.

Trip around New Orleans Harbor on Steamer Sidney, leaving hotel at 12 noon, in which will be seen, all of the harbor, publicly-owned warehouses, grain elevators, cotton warehouses and all other improvements of the Second Port of the United States, as well as the historic Chalmette Battle Grounds, where the Battle of New Orleans was fought.

Luncheon will be served on the boat, and good music provided for dancing.

#### Evening Session, 8 O'clock.

Election of officers and selection of place of meeting.

"Methods of Sewage Disposal Used by the Emergency Fleet Corporation," by Clark P. Collins, senior assistant engineer, Engineering Branch of Housing Department, U. S. Shipping Board, Emergency Fleet Corporation, Philadelphia, Pa. Illustrated by stereopticon.

"The Water Supply and Sanitation of Base Section No. 1 (St. Nazaire, France)," by John B. Hawley, consulting engineer, Fort Worth, Tex., formerly Major 503rd Engineers, Service Battalion, A. E. F., in charge. Illustrated by stereopticon.

"Army Camp Utilities," by W. L. Benham, Johnson and Benham, consulting engineers, Kansas City, Mo., formerly Major, M. M. C., in charge of Camp Utilities, Camp Funston, Kan.

"Water Supply and Sewerage Systems of Camps Meade and McClellan," by Morris Knowles and John M. Rice, chief engineer and division engineer, Morris Knowles, Inc., engineers, Pittsburg, Pa.

"The Acid Process of Sewage Treatment," by Edgar S. Dorr, engineer Sewer Service, Boston, Mass.

"The Psychological Influences of Public Improvements on the Minds of the People," by P. A. McCarthy, Lufkin, Tex.

"The Proposed National Department of Public Works," by W. B. Gregory, consulting engineer, Tulane University, New Orleans, La.

"Fairness in Specifications," by Alexander Potter, consulting engineer, New York.

### THURSDAY, NOVEMBER 13, 1919.

#### Morning Session, 9 O'clock.

Report of Committee on Street Paving, Sidewalks and Street Design: W. A. Howell, chairman, Newark, N. J.

"Proper Sands and Aggregates for Cement Concrete Roads," by Duff A. Abrams, professor in charge of Structural Materials Research Laboratory, Lewis Institute, Chicago, Illinois.

"Recent Developments in Concrete Highway Construction," by A. N. Johnson, consulting highway engineer, Portland Cement Association, Chicago, Ill.

"Mineral Aggregates for Bituminous Pavements," by Wallace L. Caldwell, director of Departments of Roads and Pavements, Pittsburg Testing Laboratory, Birmingham, Ala.

"Some New Discoveries in Bituminous Pavement Construction," by A. E. Schutte, consulting chemist, Warren Brothers Company, Boston, Mass. Illustrated.

"Roads in France and America," by Edgar A. Kingsley, consulting engineer, San Antonio, Tex., formerly Major U. S. Engineers, Superintendent of Roads, Interior Section No. 2, A. E. F., France.

Report of Committee on Standard Tests for Bituminous Materials: A. H. Blanchard, chairman, Ann Arbor, Mich.

"The Economy of Brick Street and Road Construction," by Will P. Blair, vice-president of National Paving Brick Manufacturers' Association, Cleveland, O.

"Vertical Fiber Brick Pavements," by Clark R. Mandigo, consulting engineer, Western Paving Brick Manufacturers' Association, Kansas City, Mo. Illustrated.

"Brick vs. Block for Permanent Street Paving," by S. Cameron Corson, engineer, Norristown, Pa.

#### Afternoon, 1:30 O'clock.

Automobile ride through the city, leaving the Hotel Grunewald at 2 P. M., in which the following points of interest will be visited: Retail merchandising section, theatres, public squares, City Hall, parks, colleges, water purification plant, lakeshore parks, Art Museum, Old French Quarter, the Cabildo, Cathedral, Jackson Square, and various other points of interest.

#### Evening Session, 8 O'clock.

Report of Committee on Street Lighting, C. W. Koiner, chairman, Pasadena, Cal.

"Illuminations, Ancient and Modern, with Special Reference to Decorative Street Lighting," by W. D'A. Ryan, director of General Electric Illuminating Engineering Laboratory, Schenectady, N. Y. Illustrated with special slides in colors.

"Public Ownership of Utilities in Springfield," by Willis J. Spaulding, Commissioner of Public Property, Springfield, Ill.

Reports of Committees on Standard Specifications: Sheet Asphalt Pavement, Francis P. Smith, chairman, New York.

Bituminous Macadam, Bituminous Concrete and Asphalt Block Pavements, Morris R. Sherrerd, chairman, Newark, N. J.

Broken Stone and Gravel Roads, With or Without Bituminous Surface Treatment: Arthur H. Blanchard, chairman, Ann Arbor, Mich.

Brick Pavements: E. H. Christ, chairman, Grand Rapids, Mich.

Cement Concrete Pavements: William A. Hansell, Jr., chairman, Atlanta, Ga.

Stone Block Pavements: H. H. Smith, chairman, Brooklyn, N. Y.

Wood Block Pavements: E. R. Dutton, chairman, Minneapolis, Minn.

Sidewalks and Curbs: Sylverius Sammelman, chairman, St. Louis, Mo.

Sewers: Alexander Potter, chairman, New York City.

Foundations for Pavements: Special Committee, F. P. Smith, acting chairman.

### FRIDAY, NOVEMBER 14, 1919.

#### Morning Session

Report of Committee on Traffic and Transportation, on Uniform Traffic Laws and Classification of Highways: R. Keith Compton, chairman, Baltimore, Md.

"A National Highway System and Its Relation to Traffic and Transportation," by S. M. Williams, Chairman Highways Industries Association and Federal Highway Council, Washington, D. C.

"Highway Traffic," by Frederick A. Reimer, county engineer, Newark, N. J.

Report of Committee on City Planning: Nelson P. Lewis, chairman, New York.

"Regional and Civic Planning as the Basis for Municipal Improvements," by Thomas Adams, Housing and Town Planning Adviser, Commission of Conservation, Ottawa, Canada.

"Lowland Farms Development, Youngstown, O.," by Morris Knowles, John M. Rice and E. O. Rose, Pittsburg, Pa.

"Report of Committee on Parks and Parkways," Harland Bartholomew, chairman, St. Louis, Mo.

"Architectural Design and Construction in St. Louis Parks," by Nelson Cunliff, Commissioner of Parks and Recreation, St. Louis, Mo. Illustrated.

Report of Committee on Resolutions.

#### Afternoon

Special arrangements are made for the members to break up into groups for trips to the various points of interest during the afternoon.

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## American Road Builders' Association.

The annual meeting of the American Road Builders' Association will be held Friday, Nov. 7, at the Automobile Club of America, 247 West 54th street, New York City.

The program for the morning session, beginning at 10.30 a. m. will be as follows:

Report of committee on "Uniform Highway Signs," chairman, Robert A. Meeker, consulting engineer, Newark, N. J.

Report of committee on "Convict Labor on Highway Work: Organization, Administration, Camps and Cost Data," chairman, G. P. Coleman, State Highway Commissioner of Virginia.

Report of committee on "Sources of Supply of Unskilled Labor for Highway Work," chairman, Paul D. Sargent, chief engineer, Maine State Highway Commission.

Report of committee on "Uniform High-Requirements for Highway Engineering Positions," chairman, H. G. Shirley, secretary, Highway Industries Association and Federal Highway Council.

Luncheon will be served in the grill-room of the club at 1 o'clock. Acceptances should be sent to secretary E. L. Powers, 150 Nassau Street, New York City.

The following will be the program for the afternoon session, beginning at 2.30 p. m.

Report of committee on "Economic Status of Guarantees for Pavements on Roads and Streets," chairman, Francis P. Smith, consulting paving engineer, New York City.

Report of committee on "Methods of Strengthening and Reconstructing Highway Bridges for Heavy Motor Truck Traffic," chairman, Willis Whited, bridge engineer, Pennsylvania State Highway Department.

Report of committee on "Reconstruction of Narrow Roadways of Trunk Highways with Adequate Foundations and Widths for Motor Truck Traffic," chairman, H. E. Breed, consulting engineer, New York City.

Discussion of the following resolution: Resolved: That Federal-Aid funds should be used only for the construction of trunk line roads and bridges of adequate width and strength. Discussion opened by Nelson P. Lewis, chief engineer, Board of Estimate and Apportionment of New York City.

Annual Reports of secretary, treasurer and board of directors. Election of 1919-1920 officers.

## MUNICIPAL INDEX

*(Continued from page 232)*

Street Classification and Traffic Regulation. Editorial reference to article in this issue on street classification as aid to pavement design. 500 words. Municipal Journal and Public Works, Sept. 6, New York.

**Fares**

Zone-Mile System of the Public Service Railway. Full details are given of how the zones are laid out, how fares are collected, and how trainmen and public were educated to new plan. 24 ills., 4800 words. Electrical Railway Journal, Sept. 27, New York.

Zone Fares in Springfield. Are based on central city zone with outer zone belts and two reduced-rate tickets to points in first outside zone; pay-enter and pay-leave system of fare collection. 23 ills., 5300 words. Electric Railway Journal, Sept. 27, New York.

Zone Fares Found Satisfactory in Milwaukee. Few changes found necessary in this pioneer of the zone-fare system in this country; fare collection offers no difficulties; elacticity is an advantage. 12 ills., 4500 words. Electric Railway Journal, Sept. 27, New York.

Typical Zone Tickets from Abroad. Exhibits from Europe, Asia and South America show use of three general types; "duplex," "check-stub" and "fixed-amount, ride-limit." By F. C. Cusani, Milan, Italy. 24 ills., 1800 words. Electric Railway Journal, Sept. 6, New York.

Zone System in Portland. Maine Public Utilities Commission helps to solve tare problem; special tickets used for collection purposes; system works satisfactorily on all types of cars. 11 ills., 5300 words. Electric Railway Journal, Sept. 27, New York.

Discussion of Fare Systems. Present fare systems classified and compared; fundamentals of a scientific system outlined. 300 words. Electric Railway Journal, Sept. 27, New York.

Net Result of 5-Cent. Fare. History of its effect on large company carried through three generations; lesson from this pointed out. By J. R. Bibbins, the Arnold Co., Chicago. 1 ill., 2000 words Electric Railway Journal, Sept. 20, New York.

**Miscellaneous:**

Contracts and Freight Rates. Contractors should protect themselves against increased cost which would follow an advance in freight rates. 660 words. Municipal Journal and Public Works, Sept. 20, New York.

Federal Commission Questionnaire. Federal Electric Railways Commission has issued a list of 168 questions on electric topics. 4500 words. Electric Railway Journal, Sept. 20, New York.

Electric Trucks and Tractors in the Iron and Steel Industry. Industrial electrical apparatus offers many advantages for use in smelting plants, foundries, etc.; handling problems of this industry; need for employing good operators. By B. J. Dillon. 3 ills., 2000 words. Electrical Review, Sept. 27, Chicago.

The Economic Limit to Motor Truck Weights. Continuation of article published in issue of Jan. 1, 1919. By R. C. Barnett, economic engr., Kansas City. 5 charts, 4600 words. Engineering and Contracting, Oct. 1, Chicago.

### FIRE AND POLICE.

Card Index of Fire Hose. Used by Columbus, O., since two years. 150 words. Municipal Journal and Public Works, Sept. 6, New York.

New York Fire College Course. Fire streams, nozzles and hose lines. Care of fire hose; care of hose while not in use; pressure tests. (Continued.) 2000 words. Fire and Water Engineering, Sept. 3, New York.

New York Fire College Course. Fire streams, nozzles and hose lines; engineering experiments; resistance of stream of water. (Continued.) 3 charts, 2 tables, 1400 words. Fire and Water Engineering, Sept. 10, New York.

New York Fire College Course. Fire streams, nozzles and hose lines; high pressure systems. (To be continued.) 2 ills., 2000 words. Fire and Water Engineering, Sept. 17, New York.

New York Fire College Course. Fire Hydrants. Spacing hydrants; setting; high pressure hydrants in New York. 4 ills., 1600 words. Fire and Water Engineering, Sept. 24, New York.

New York Fire College Course. Fire Hydrants. Performance of the high-pressure system. (Continued). 2 ills., 900 words. Fire and Water Engincering, Oct. 1, New York.

Reduction of Insulation Resistance in High Pressure Fire Service Motors, Due to Moisture. 1500 words. Engineering and Contracting, Oct. 8, Chicago.

The Motor Fire Apparatus. A simple outline of its construction and maintenance. By C. B. Hayward, M. S. A. E. (Continued.) 2 ills., 1000 words. Fire and Water Engineering, Sept. 10, New York.

Motor Fire Apparatus. Simple outline of its construction and maintenance. By C. E. Hayward, M. S. A. E. 2000 words. Fire and Water Engineering, Sept. 17, New York.

Motor Fire Apparatus. A simple outline of its construction and maintenance. By C. B. Hayward, M. S. A. E. 1200 words. Fire and Water Engineering, Oct. 1, New York.

Private Fire Protection Service. Excerpts from final report of committee on private fire protection service of American Water Works Association; metering sprinkler connections; prevention of "bleeding." (Continued.) 2 ills., 3 tables. 1700 words. Fire and Water Engineering, Sept. 10, New York.

Private Fire Protection Service. Excerpts from final report of committee on private fire protection service of American Water Works Association; limit to size of private fire service connection. (Continued.) 2 ills., 1800 words. Fire and Water Engineering, Oct. 1. New York.

Albany Fire Alarm System. Description of up-to-date and complete system; provision made for future expansion; ample number of extra circuits arranged for. By Wm. B. Martin, supt., fire alarm telegraph, Albany fire dept. 1 ill., 1000 words. Fire and Water Engineering, Sept. 17, New York.

State Fire Marshals Meet in Toronto. Annual convention of Fire Marshals' Association of North America convenes in Canadian city; many papers of great interest read and discussed. 1 ill., 3000 words. Fire and Water Engineering, Sept. 10, New York.

Public Employment That Is a Public Trust. Editorial reference to the Boston police strike. 1000 words. Municipal Journal and Public Works, Sept. 20. New York.

### GOVERNMENT AND FINANCE.

City Manager Plan Thrives Under Handicaps. By H. G. Otis, secy., City Managers' Ass'n. 700 words. American City, September, New York.

Change from Private to Municipal Ownership. Reference to pamphlet published by the consulting engineers. Burns & McDonnell, entitled "100 Reasons why 100 Cities Have Changd from Private to Municipal Ownership." 100 words. Municipal Journal and Public Works, Sept. 27, New York.

National Conference on Public Ownership League of America to be held in Chicago; subjects include railway, municipal electric light and power, water works, gas, telegraph and telephone, markets, mine, etc. 800 words. Municipal Journal and Public Works, Sept. 27, New York.

Utility Questions Among Most Important of Times. Chairman Higgins of Connecticut commission says private ownership with careful but general public regulation is preferable. 1200 words. Electrical World, Sept. 6, New York.

Common Errors in Municipal Finance. Crude financial legislation; lack of modern accounting methods; improper handling of bond issues; competitive buying. 1200 words. Engineering and Contracting, Sept. 24, Chicago.

Municipal Bond Sales Break the Record. More than 20 per cent higher than total for any previous similar period. 150 words. Municipal Journal and Public Works, Sept. 13, New York.

### STRUCTURES AND MATERIALS.

**Concrete:**

Studies in Surface Area Proportioning Method. Discussion of R. B. Young's paper in June 26, 1919, issue of Canadian Engineer. surface area vs. fineness modulus; results of tests on bulking effect of moisture in sands. By L. N. Edwards, sr. highway bridge engr., U.S. Bureau of Public Roads. 4 charts, 2700 words. Canadian Engineer, Oct. 9, Toronto, Ont.

Effect of Vibration, Jigging and Pressure on Concrete. Results of tests made as part of experimental studies carried out through co-operation of Lewis Institute and Portland Cement Ass'n. By D. A. Abrams, prof., structural materials research laboratory, Lewis Institute, Chicago. 7 charts, 2800 words. Engineering and Contracting. Sept. 24, Chicago.

Concrete and Its Application to Municipal work. Recent development in system of reinforced concrete structure, used extensively by Port of London Authority; the "M. P." system of concrete structure. 1 ill., 1400 words. Municipal Engineering and Sanitary Record, Aug. 28, London, Eng.

Significance of Cracks in Reinforced Concrete Construction. Minor temperture cracks unimportant; causes of serious cracks; an Australian case; cracks foreseen by designers. By S. H. Harris, from proceedings of Royal Victorian Institute of Architects. 1800 words. Canadian Engineer, Sept. 25, Toronto, Ont.

Better Concrete: The Problem and Its Solution. Cement waste; causes of concrete disintegration; factors affecting formation of good concrete; composition of aggregate; photographic studies. Paper before the Engineers' Club of Philadelphia, by N. C. Johnson, consulting concrete engr. 15 ills., 7000 words. Journal of Engineers' Club of Philadelphia, September, Philadelphia.

Fine Grained Concrete Sands. Engineering division of University of Texas is planning systematic study of sands with reference to their value in concrete construction. By F. E. Giesecke, prof. architectural engrg., University of Texas. 1000 words. Canadian Engineer, Sept. 4, Toronto, Ont.

More Against Mortar for Concrete. Letter to editor referring to article in former issue entitled "Mortar Test Does not Insure Good Concrete Aggregate," from J. O. Jones, University of Kansas. 800 words. Engineering News-Record, Sept. 18, New York.

Further Researches in Rodding Concrete. Letter to the editor from F. E. Giesecke, prof. of architectural engrg. and head of div. of engrg., University of Texas. 2 ills., 800 words. Engineering News-Record, Sept. 11, New York.

Little Danger in Rich Concrete. Editorial reference to facts pointed out by various engineers in a symposium in this issue. 300 words. Engineering News-Record. Sept. 11, New York.

Compact Portable Outfit for Testing Aggregates in the Field. Description of apparatus; suggested methods of sampling; volumetric silt determinations. 1 ill., 2400 words. Engineering and Contracting, Oct. 1, Chicago.

**Bridges:**

Scamped Highway Bridges. Report of investigation made in Indiana shows that not one bridge or culvert examined was constructed according to plans and specifications. 900 words. Municipal Journal and Public Works, Sept. 20, New York.

*(Continued in next issue)*

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## CITY ENGINEERING AND MOSQUITO CONTROL.

A general idea seems to prevail that mosquito control, insofar as it is a governmental function, concerns the health department only. But in only a part of this country is health believed to be involved in the problem, while in all sections comfort is advanced by eliminating the pests.

Dust and smoke elimination are entrusted to engineers, and to a considerable extent that of mosquitoes must be also. For mosquitoes cannot breed without water, and removing the breeding spots involves drainage of swamps and pools, regulation of streams, reconstruction of catch-basins, etc., while the formation of new spots can be prevented by the proper planning of highway embankments, sewer inlets, grading of parks and other public lands, and all other public works which, if not planned with this idea in view, might serve to collect water wherein mosquitoes could breed. In most cases only forethought is needed to avoid the creation of such breeding places, the additional cost involved being little if anything. Some detailed suggestions along this line are given in the first article in this issue.

## AN EQUALIZING RESERVOIR FOR LABOR.

Labor and the laborer present the supreme problem in America today. Of this problem, the feature of involuntary unemployment does not at present appear as an important element, but it has been in the past and undoubtedly will be again.

That there has always been this problem of intermittent unemployment is not creditable to our civilization. It would seem possible to devise some system by which the occasional labor surplus could be utilized to the benefit of both the laborer and the public. Such utilization would probably need to be on public rather than private work, by the city, state or federal government. If properly planned and directed, there would seem to be no reason why the benefit to the public from this should not be nearly as great as from any public works.

It would seem that cities might aid to this end by providing and keeping constantly available, public works that can be taken up at any time, by either large or small gangs, and that, while desirable, are not pressingly necessary. Work of this kind can, we believe, be found in almost any city or town. Grading and the general improvement of parks and of the grounds about pumping stations, sewage and refuse disposal plants, railway stations and other public areas, de-silting reservoirs, and draining low lands are illustrations of what we have in mind.

To be done to advantage, such work should be planned ahead and not on the spur of a sudden demand for employment. Probably every civilized nation has filed away, through its war department or board, plans for the conquering of each of the neighboring countries, so complete that on a day's notice they can be set into operation. Similarly, a city's engineer or board of public works can prepare and keep up to date plans for doing work of the character referred to, providing for using any number of men, from five to five thousand, in either winter or summer.

With such a reserve of public work, there should be no excuse for unemployment and much less of public funds or private benevolence would need to be spent in charity and correction work, while the discontent of labor should be greatly reduced.

# MOSQUITO CONTROL FOR THE MUNICIPALITY.

Draining Wet Lands, Pools and Other Places To Prevent Breeding—Clearing Out Channels and Denuding Shores—Filling in Low Spots—Methods of Operation and Approximate Cost.

BY W. A. HARDENBERGH.
Assistant Sanitary Engineer, U. S. Public Health Service.

There are two main reasons for mosquito-control work. The first is from the standpoint of public health; the second from personal comfort and to increase property or land values. These motives will be uppermost according to the location of the community, as within or without the malaria belt. The accompanying map, published by the Public Health Service, shows those regions of the country in which malaria is prevalent. But the mosquito is universal. From the equator to the far north, he—or rather "she," for only the female mosquito bites—is one of the inveterate enemies of man-kind. In practically every locality there is a mosquito problem.

Within the past few years many communities have taken up mosquito elimination work from one or the other of these reasons. Before the war, New Jersey, through local agencies, as counties and cities, was spending annually large sums of money in doing away with this winged pest, though in New Jersey the problem is one of comfort and financial return, rather than health. Likewise, in the South many cities had instituted anti-malarial work as a part of their health work. But with the intensive anti-malarial and anti-mosquito work that the government, through the Public Health Service, carried on during the war to protect the health of the soldiers in the cantonments, many more communities have visioned the possibilities and profits of mosquito elimination work. A large number of those places where this work was carried on during the war at governmental expense, are now providing local funds to continue and maintain the work, while other cities, seeing the advantages from advertising, health and financial viewpoints, have also set aside money for inaugurating such campaigns. To many of these places, the government, through the Public Health Service, is supplying aid by furnishing sanitary engineers and other trained personnel, whose salaries are paid by the government. Summer and winter resorts and industrial centers have been prominent among the cities quick to see the immediate returns sure to follow such a campaign.

### THE PROBLEM.

Though there are many species or kinds of mosquitoes, they all have certain points in common and the same control methods may be applied to them all, with minor exceptions. The malaria mosquito, *Anopheles*, breeds less widely than some of the other groups and consequently its control may be accomplished at a cost somewhat less than that of the others. *Culex*, the ordinary house mosquito, breeds in almost any sort of standing water, including sewage, in which it differs from *Anopheles*, which is found only in comparatively clean, clear water. *Aedes sollicitans* is a product of the salt marshes, mainly, while *Aedes calopus* breeds in rain barrels, tin cans, and water tanks near houses.

*Anopheles*, as has been stated, is the carrier of the malarial parasites. *Culex*, while a pest and a hard biter, is not so important a carrier of disease, though in warmer countries it transmits filariasis and in our own climate is said to carry dengue fever. *Aedes sollicitans* is not a carrier of any disease, so far as is known. *Aedes calopus* is the yellow fever carrier, but as the yellow fever germ is practically non-existent in the United States, the danger is now more academic than real provided no cases are introduced from without. There are several species of *Anopheles*, some of which are not important carriers of malaria, but no attempt will be made here to describe them at length. For those seeking more complete data, reference is made to the publications of the Public Health Service, where much detailed and valuable information will be found.

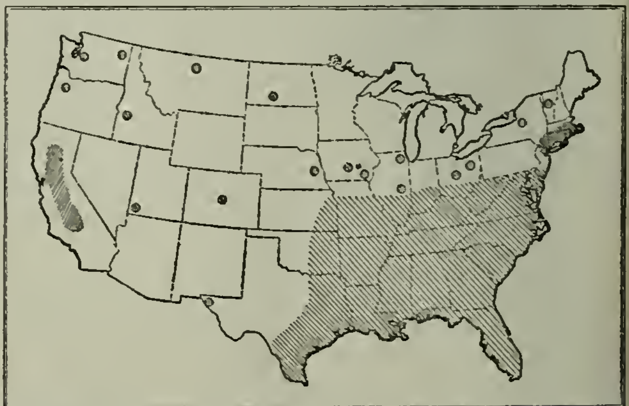
The maximum flight range of the mosquito is, roughly, about a mile. While some mosquitoes will travel further than this in small numbers ordinarily, or when favored by winds, in large numbers, elimination of breeding and sheltering places within the one-mile limit can be relied upon to limit the numbers of mosquitoes to a scarcely noticeable point. An exception may be noted in the case of *Aedes sollicitans*, where, with favoring strong winds, large numbers may occasionally travel for as much as twenty or thirty or more miles.

In the development of the mosquito, water is necessary for the first eight to fourteen days. The mother mosquito lays the eggs on the surface of the water. In 24 to 36 hours, these hatch out into larvae ("wiggletails"), which after seven to ten days turn into pupae ("tumblers"). In another thirty-six hours, the pupae issue as adult mosquitoes and fly away looking for their first meal of blood. The larvae of *Anopheles* can be identified by their position in the water, for they lie parallel to the surface, breathing through their tails, while the other larvae, though they breathe in the same fashion, lie at an angle to the surface. There are also differences between the pupae, though these differences are not so readily detected. The various adults can be recognized with ease. *Anopheles* when resting appear to be standing almost on their heads and their legs stick up in a distinctive fashion; their wings have spots, the number and location varying with the species to which they belong. The salt water mosquitoes are usually striped on the legs and beak. *Culex* have wings veined, more like those of a fly, and take a hunch-backed position while resting.

Water being a necessity for the first eight days or more, the problem of mosquito control becomes one of the elimination or control of such water as may breed mosquitoes. Standing water in the one-mile zone must be drained, filled, oiled or otherwise treated so that the mosquito will not breed in it.

Roughly speaking, mosquito control methods include two classes of work. One falls within the province of the sanitary engineer and consists mainly of ditching and drainage, filling, oiling, management and administration. The second is adjunct to the first and includes inspections of water containers, gutters, tanks, troughs and similar possible breeding places and their elimination as mosquito producers. This work may be combined with the general sanitary inspections already regularly carried on by many city health departments. It is with the first mentioned kinds of work that this article will deal mainly.

Before starting the work, a complete survey should be made of the area to be drained and the results of this survey, with data as to the importance of the breeding places found, should form the basis of the plan. In the case of the city, sufficient maps and surveys may be available for the preliminary work, when supplemented by a thorough inspection of the ground, so that a comprehensive scheme of work may be laid out at once. A map drawn to a large scale—400 to 600 feet to the inch—is a practical necessity. Completed work may be plotted on this map or on blue-prints or tracings made from it, thus giving a graphical record of the progress of the work.



ENDEMIC AREAS OF MALARIA IN THE UNITED STATES.
Shaded Circles Represent Localities in Which Cases of Malaria Occur and in Which the Disease is Probably Endemic.

### DRAINAGE

The actual work of mosquito control is simple in most cases. In the construction of ditches, slopes should be such that, while there will be no standing water when the flow is small, the velocity, when they are running full, will not be so great as to cause erosion; curves of large radius should be used where possible; the section should be such as to minimize flood damage or choking from weed growths. Other work will include the cleaning of roadside ditches; lowering and cleaning culverts; ditching springs and seepage areas; cleaning and denuding pond and lake edges; cleaning and training streams; and filling low places.

Ditches for drainage work should not be too large, for this increases both first cost and maintenance. It should be borne in mind that eight days is the minimum time in which a mosquito can develop and that the time is usually several days longer, so that a ditch large enough to drain an area in four or five days is ample, even though rains occur at less than week intervals. Ditches having a V-shaped section with the bottom slightly rounded will stand up better and require less maintenance than those with vertical sides. The narrow bottom has an additional advantage in concentrating the flow in a constricted space and reducing isolated pools where the amount of water carried is small. For this reason, where a large ditch is necessary, a smaller one, "one shovel wide," should be dug in the center to carry the dry-weather flow.

MAINTENANCE GANG CLEANING OUT OLD DITCH.

TYPE OF DITCH BEST SUITED TO MARSH OR WET LAND DRAINAGE

In soils where heavy rains do not wash or fill, open ditches will be satisfactory and cheaper. These will have to be cleaned at least twice a year, probably oftener in the Southern states where vegetation grows more rapidly. They should have attention just after the spring floods have subsided and again later in the summer, when the weedy and other growths should be removed. Tile drains or lined ditches may prove more economical in some localities, though the first cost be greater. Quite frequently property owners will contribute to the work to the extent of buying the tile, in preference to having an open ditch through their property. Tile drains may be laid at the usual grades for storm sewers and should have "sink-holes" of broken stone, brick bats, etc., located over them at frequent intervals to carry off standing or surface water.

BEFORE AND AFTER CLEANING EDGES.
Above, a Paradise for Mosquitoes; Below, Not a Menace or Mosquito Producer.

In more outlying regions or where something less costly than the tile drain but better than the open ditch is desired, a lined ditch may be used. These are especially desirable where, because of washing, maintenance costs may be heavy. Tile of the required size may be split lengthwise and laid in the bottom of the ditch, the ends being cemented together. Damaged or poor quality of tile may occasionally be used at a saving. A reinforced concrete lining is also possible at a low cost. A strip of chicken-wire netting furnishes the reinforcement and the concrete lining is placed as desired in the bottom and as far up the sides of the ditch as may be considered necessary. Caution in the use of this type will be necessary where frosts are severe and heaving common.

While it will not be possible in this article to enumerate and describe the many problems that may come up, a few of the typical cases will be described and the plan of procedure outlined. Where possible an estimate of the cost of the work will be given, but local conditions vary to such an extent that these costs can be considered only as approximate. In the consideration of costs, it must be borne in mind that in the examples given, men were paid at the rate of $2.50 per day and foremen $4.

Meandering small streams with occasional pools of dead water are frequently quite prolific producers of mosquitoes, both *Culex* and *Anopheles.* These are best treated by cutting brush along the stream channel and for a couple of feet back from the edge, and straightening and cleaning the channel. This will eliminate the pools. The water level can be lowered by ditching the high places and this will produce a stronger and more uniform flow. As few mosquitoes will breed in running water, this work will be effective as long as the channel is maintained in good condition. This work is not costly and a fair estimate of treating the average small stream is $50 to $100 per mile. When estimating stream length from a map, the windings and turnings should not be ignored. A good rule is to multiply by three the map length of the stream to secure the actual winding field distance.

Larger sluggish streams, such as the bayous of the South, may be treated by removing the log jams and other obstructions and debris holding back the water. This will reduce the water level by several feet, thus lowering the water to mud banks. The final treatment is to clean and straighten the channel and allow a free flow for the water. Animal or hand-power or dynamite may be used in removing the logs and other drift from the streams.

Swamps are usually quite heavy producers of all the fresh-water varieties of mosquitoes. Though the great majority of swamps do not present very difficult drainage problems, exceptions are at times found. Not infrequently, in the South, the value of the timber made available by drainage may pay a substantial part of the cost of draining. In many cases, if an adequate outlet is provided, the swamp will drain itself. When the water has run down, the ditch should be deepened and extended through the swamp and to the feeders. In this work, where the ground is soft and may have tendencies toward sliding, wide shallow ditches should be used, or the sides of the ditches may be braced or retained by saplings.

Where a large part of the water supply of the swamp comes from seepage water oozing from the bases of surrounding hills or ridges, the above treatment will accomplish little. The central ditch has only a local effect and it will be necessary to construct an intercepting ditch around the toe of the hill, thus cutting off the swamp feeders and carrying the water out to the main ditch. The drawing herewith shows graphically the method of ditching where this type is encountered.

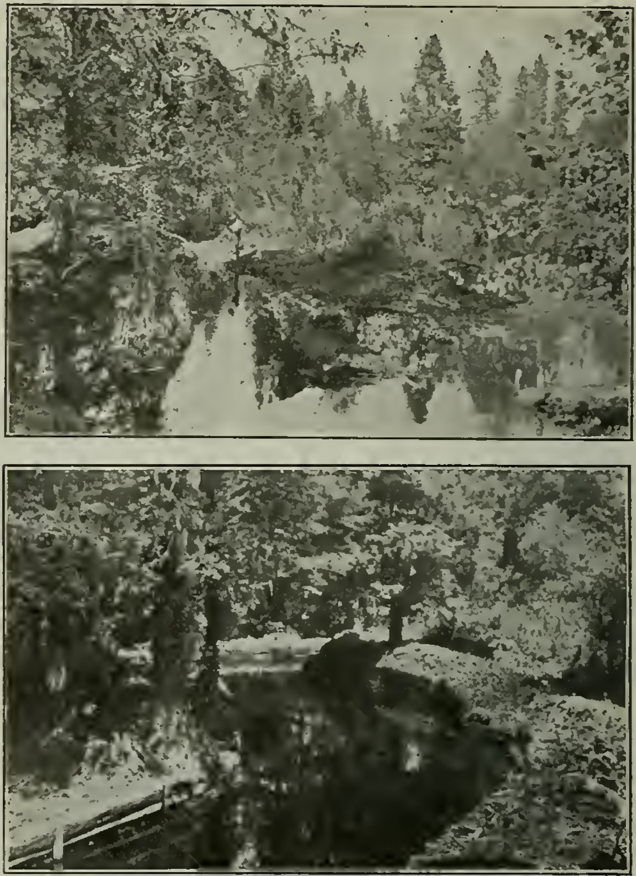
Closely connected with this problem is the question of seepage outcrops on hill-sides. These can best be treated by cutting small collection ditches along the hill at the point of outcrop and carrying away the water thus collected in main ditches. These collection ditches should generally follow contour lines, but should have enough slope to insure a good flow. An important point is to follow the seep to the point of real issuance from the underground strata.

It is not possible to give an accurate idea as to the cost of ditching work of this kind. The size of ditch, kind of soil and other local conditions enter too largely into the cost to make an estimate of any value.

### REMOVING VEGETATION.

Where a body of water that cannot be drained economically is producing mosquitoes, the banks may be denuded and all vegetation removed for a foot above the water line. This method of control can also be applied to rivers, where the flow is sluggish and the rise and fall small. In this work, the main value of the treatment lies in having a sharp and grassless edge, so that there will be no hiding places for the larvae. Even if there are few minnows, so that fish control cannot be relied upon, this method, especially when supplemented by oiling at seven-day intervals, will be very effective. If the banks are steep and the water fairly deep, work can best be carried on from a boat or raft. In this case, all tools should be fastened by stout strings to floats or to the boat to reduce losses. Axes, bush-hooks, hoes and shovels are the best tools for this work.

RESULT OF CLEANING LOGS AND OTHER DEBRIS FROM CHANNEL.
Lowered Water Level Prevents Breeding. Original Water Level Shows at Tree Bases.



BEFORE AND AFTER CLEANING CHANNEL.
Removing Brush and Taking Advantage of All Available Fall.

Heavy hoes, which have weight enough to chop small roots with, and which do not break easily, are much superior to the ordinary hoe found in most hardware stores. The cost of this work is comparatively slight, usually running about $25 to $35 per mile of shore line. The same caution applies to this work as to stream channeling when computing lengths from a map, as the estimate will usually run considerably short of the actual distance.

In many cities it will be found that roadside ditches and gutters will be large producers of mosquitoes. In the case of the deeper ditches or gutters, the remedy is to clean and remove all obstructions to the flow, so that after a rain there will be no standing water. The roadside ditches can be cleaned cheaply and easily with a ditcher or road machine. Grass and weeds should be removed and a clean, sharp ditch left. An occasional low place will do little damage if all protective covering is removed, as mosquitoes will rarely breed in these open pools where there is no cover. Moreover, the sun and wind will usually dry up such pools in less than a week.

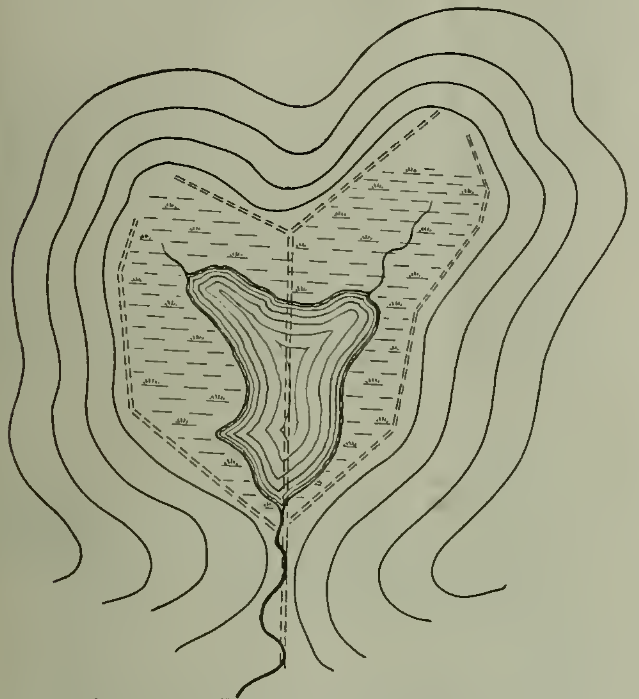
A trip with a road machine or ditcher over these roadside ditches early in the spring and again later in the summer, removing grass and weeds and leaving a clean ditch, will not only remove mosquito breeding possibilities, but will keep the ditches in better shape for performing the work for which they were intended. The cost is small. Making two trips over each ditch, the cost will be about $25 to $40 per mile per ditch or twice this per mile of road.

### DITCHING WITH DYNAMITE.

The use of dynamite as a labor, cost and time-saving agent is worthy of consideration. Dynamite is especially valuable in ditching in soft mud areas, in swamps where roots, vines, brush and mud make hand ditching costly, in underwater work, and in clearing logs and debris from watercourses. Though its use is limited mainly to localities where there is a saturated soil, it is a valuable and reliable agent, where it can be used. The cost of ditching with dynamite is about two-thirds the cost of hand ditching, but its chief value is as a time saving element. Three or four men with dynamite can do the work of many times that number of hand ditchers.

With competent handling, ditches of almost any size or depth can be blown. Fifty per cent or sixty per cent straight dynamite is generally most satisfactory and cheapest for this class of work. This can be exploded by the "propagation" method from one stick fired by cap and fuse in the middle of a long string. Firing by electric current is highly satisfactory, but more costly; much time is lost in arranging and fixing connections.

For ditches 2½ to 4 feet deep and 2 or 3 feet wide, a single row of sticks spaced about 18 inches apart can be used. The charges may be placed 18 to 24 inches in the ground and the firing done in sections of 100 feet at a time. For wider ditches, two or more rows, staggered, may be used. Deeper ditches can be blown by using relays. For under-water excavating, removing log jams, deeply imbedded logs and debris from stream beds, dynamite is also very valuable. In all dynamite work, an expert should be employed. It is far best to secure from the dynamite company the services of a competent man; such a man will pay for himself several times over, even on a small job.



DITCHING A SWAMP SURROUNDED BY HILLS.

FISH CONTROL.

In addition to the methods of control by drainage, fish control may be a valuable aid at times. In the case of a lake or pond used as pleasure resort or for industrial purposes, drainage may not be possible, while cleaning of the edges and oiling may be impractical from financial or topographical reasons. It may be possible, though, to raise the water level of the lake two or three feet early in the spring. By keeping the water at this height till May or June, the inundated strip of vegetation along the shore will be killed. When the water level is lowered to the normal stage, this dead vegetation will not furnish hiding places for the larvae. Consequently top-feeding minnows will destroy them and breeding will be small. When fish are not present, they may be transplanted from another lake or secured from government or state fish hatcheries. Only the top-feeding minnows —Gambusia, Killifish, etc.—should be introduced. Success of this method of control will be indicated by the absence of pupae and of full-grown larvae, though partly grown larvae may be found.

OILING.

Oiling and the kindred measures, such as the use of larvacides or of a creosote spray, may, in general, be regarded as temporary and costly, though extremely valuable measures. In those sections where suitable oil is produced and may be secured at a low price, municipalities may find it cheaper to oil some areas than to treat them permanently. In every case there will be some few areas that are almost impossible to handle any other way, but economy dictates that these shall be reduced to a minimum. In this connection, filling will be found very valuable. It has, also, the advantage of permanency with no cost for up-keep.

The best way to apply oil is by the knapsack sprayer, though drip-cans may be used to advantage in many places, especially on flowing streams. Oiled sawdust and the like have proved to be very valuable under certain conditions. The use of niter cake as a larvacide is possible in treating water in small containers, as in rain water barrels, fire storage tanks, etc. Niter cake will inhibit breeding for about four months after a single treatment. Other local products may occasionally be found that can take the place of costlier imported products.

INSPECTION AND MAINTENANCE.

In every kind of mosquito control work the ultimate test of the value of the work, at least in the popular mind, will be the presence or absence of mosquitoes. To keep in close touch with the production of mosquitoes and the localities producing them is important and strict inspections should be made of the entire zone at weekly intervals during the summer months. When combined with the data obtained by catching adult mosquitoes wherever possible and the breeding out of larvae, these inspections should show the locations producing mosquitoes. On this work, a good inspector is a prime essential.

The organization to carry on a campaign of this sort for a city of about a hundred and fifty thousand population is not necessarily large, nor will the work be very costly unless the local conditions are of an extraordinary character. In addition to a well-trained engineer directing the work, there should be twenty to thirty laborers, divided into two gangs, each with a foreman. If more men be employed, a general foreman may be needed. The equipment will include a light truck and the necessary tools for this number of men, as axes, hoes, mattocks, bush-hooks, picks, and long-handled, round-pointed shovels. The man in charge of the work should be furnished with transportation.

POND CONTROL BY DENUDING AND CLEANING EDGES.
With Supplementary Oiling When Necessary, This is Very Effective and Not Costly.

For the maintenance of the work, once the actual construction has been completed, a much smaller force will suffice, perhaps not more than five or six men. In the early spring, when the entire system is in need of cleaning and general maintenance work, it may be economical to employ a larger number for a few days, while putting the work in shape for the summer. A good and reliable foreman is a necessity and when one is found, he should be retained. It will also usually pay to retain the men from year to year, employing them otherwise during the winter months, if necessary.

### AID BY CITY ENGINEERS.

While not every city in the country is yet able or willing to inaugurate an anti-mosquito campaign, the engineer can prepare for the coming day in many ways. In looking over the conditions around his own city, he cannot fail to be impressed by the fact that many of the most prolific mosquito-breeding areas are man made. Railroad and highway construction borrow-pits are among the most common breeding places for all classes of mosquitoes and are difficult to correct. Fills without drains have cut off small areas and formed stagnant pools, ponds or swamps. Culverts are frequently too high, backing up water, or too low, allowing small pools to collect under them. All these and many other similar faults are remediable now only at a great and disproportionate expense. The engineer should scrutinize carefully all new plans for similar improvements and should insist upon the modification of those features which offer similar opportunities for similar nuisances.

Even the present day catch-basin, for example, offers an almost unexampled opportunity for producing mosquitoes, though the main product will be *Culex*. About the only way to prevent breeding is to oil at weekly intervals. A small bag filled with oiled sawdust and suspended from a wire may be used instead. Such an arrangement will need less attention, but the sawdust should be renewed about twice a month.

The cost of an anti-mosquito campaign and the resulting maintenance work is often surprisingly small. In many cases the cost has been actually less than the annual cost of house screening and screen repairs. In the malarial regions, the results from the standpoint of health are astonishing; in the matter of increased personal comfort and better living conditions, no estimate of the money value can be made; the increase in property values must also be considered.

It has been possible in this article to touch only a few of the salient points of the work, to give the municipal engineer and the progressive city official a view of the results possible of attainment and of the type of work necessary to secure these results. Very complete data on this subject in greater detail and covering a much wider range can be obtained from the publications of the Public Health Service. A list of these publications is appended hereto.

To associate sanitary engineer Harry R. Crohurst and assistant sanitary engineer A. W. Fuchs, of the United States Public Health Service, acknowledgement is hereby made for the advice and assistance rendered and the data furnished, as well as for various of the illustrations used. The publications of the Public Health Service have also been used freely in compiling the data herein given.

### PUBLICATIONS RELATING TO MALARIA, AND MOSQUITO CONTROL.

#### Public Health Bulletins.

79. Impounded Water. Surveys in Alabama and South Carolina During 1915 to Determine Its Effect on Prevalence of Malaria. By H. R. Carter, J. A. A. Le Prince, and T. H. D. Griffits. 1916.

84. Is Mosquito or Man the Winter Carrier of Malaria Organisms? By M. Bruin Mitzmain. December, 1916.

88. Malaria Control: A Report of Demonstration Studies Conducted in Urban and Rural Sections. By R. C. Derivaux, H. A. Taylor, and T. D. Haas.

#### Reprints from the Public Health Reports.

28. Prevention and Destruction of Mosquitoes. By Joseph Goldberger. July 17, 1908.

105. Antimalarial Measures in Farmhouses and Plantations. By H. R. Carter. December 6, 1912.

156. Malaria in North Carolina. By H. R. Carter. December 19, 1913.

160. Malarial Fevers. Prevalence and Geographic Distribution in Arkansas. By R. H. von Ezdorf. January 2, 1914.

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172. Malarial Fevers. Prevalence and Geographic Distribution in South Carolina, Georgia, and Florida. By R. H. von Ezdorf. March 13, 1914.

180. Malarial Fevers in the United States. By R. H. von Ezdorf. April 10, 1914.

186. Malarial Fevers. Prevalence and Geographic Distribution in Alabama. By R. H. von Ezdorf. May 1, 1914.

193. Malarial Fever. Prevalence and Geographic Distribution in Mississippi, 1913. By R. H. von Ezdorf. May 22, 1914.

217. Mosquitoes and Malaria. Report on a Short Trip in Eastern North Carolina. By Ch. Wardell Stiles. September 4, 1914.

244. Impounded Water. Some General Considerations on its Effect on the Prevalence of Malaria. By H. R. Carter. December 25, 1914.

248. Impounded Waters. Their Effect on the Prevalence of Malaria. Survey at Blewetts Falls. By H. R. Carter. January 1, 1915.

257. Impounded Waters. A Study of Such Waters on the Coosa River in Shelby, Chilton, Talladega, and Coosa Counties, Ala., to Determine the Extent to Which They Affect the Production of Anophelines, and of the Particular Conditions Which Increase or Decrease Their Propagation. By J. A. A. Le Prince. February 12, 1915.

258. Malaria Control. Drainage as an Antimalarial Measure. By J. A. A. Le Prince. February 19, 1915.

260. Control of Malaria. Oiling as an Antimosquito Measure. By J. A. A. Le Prince. February 26, 1915.

272. Anopheline Surveys. Methods of Conduct and Relation to Antimalarial Work. By R. H. von Ezdorf. April 30, 1915.

277. Malaria in the United States. Its Prevalence and Geographic Distribution. By R. H. von Ezdorf. May 28, 1915.

290. Anopheles as a Winter Carrier of Plasmodium. The Mosquito as a Prophylactic Indicator. By M. Bruin Mitzmain. July 16, 1915.

327. Tertian Malarial Fever. Transmission Experiments with Anopheles Punctipennis. By M. Bruin Mitzmain. May 12, 1916.

328. Demonstrations of Malaria Control. By R. H. von Ezdorf. March 10, 1916.

359. Anopheles Infectivity Experiments. An attempt to Determine the Number of Persons One Mosquito Can Infect with Malaria. By M. Bruin Mitzmain. September 1, 1916.

382. Malaria: A Public Health and Economic Problem in the United States. By John W. Trask. December 22, 1916.

463. Breeding of Anopheles Quadrimaculatus in Deep Water and at a Distance from Shore. By H. R. Carter. April 19, 1918.

464. Effect of Anopheles Punctipennis on Natural Conveyance of Malarial Fever. By H. R. Carter. April 19, 1918.

476. Malarial Control. By J. E. Sparks. July 12, 1918.

480. The Relation of the Railroads in the South to the Problem of Malaria and Its Control. By R. C. Derivaux. August 2, 1918.

491. Winter Hibernation of Anopheles Larvæ. By T. H. D. Griffitts. November 15, 1918.

493. Use of Dynamite in Antimalarial Drainage Operations. By J. K. Hoskins and W. E. Hardenburg. November 22, 1918.

495. Anopheles Crucians: Habits of Larvæ and Adults. By C. W. Metz. December 6, 1918.

500. Some Aspects of Malaria Control Through Mosquito Eradication. By C. W. Metz. Public Health Reports. January 31, 1919.

#### Supplements to the Public Health Reports.

11. What the Farmer Can Do to Prevent Malaria. By R. H. von Ezdorf. February 13, 1914.

18. Malaria: Lessons on its Cause and Prevention. By H. R. Carter. July 7, 1914.

32. Field Identification of Malaria-Carrying Mosquitoes. By Ernest A. Sweet. October 19, 1917.

Copies of any of these publications may be obtained by addressing the United States Public Health Service, Washington, D. C.

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# MONTEZUMA SEWAGE TREATMENT PLANT

## Some Unusual Features of a Small Plant—Itemized Cost of Earthwork, Concrete, Filter Media and Drains.

A sewage treatment plant for the town of Montezuma, Iowa, designed by Prof. J. H. Dunlap of the State University of Iowa and recently completed, contains one or two unusual features of interest.

The town contains a population of about 1,500 and the plant was designed for 2,000, assumed as the population twenty-five years hence. The plant consists of an Imhoff tank, siphon chamber, two intermittent sand filters and a sludge bed.

The tank is of the circular type, with an area of gas vent 23.6 per cent of the whole superficial area of the tank. This is a larger area than is found in most plants, but in view of the trouble that has been caused by too small vents and the extreme freshness of the sewage, liberal allowance for both scum and sludge were thought desirable.

The sludge storage capacity up to within three inches of the bottom of the inverted V beam forming the overlap for the vents is about 1.67 cubic feet per capita on a basis of 2,000 future population, and up to the slots is about 1.88 cubic feet per capita.

On the basis of 100 gallons per capita per day (which allows for ground water infiltration) with uniform flow throughout the 24 hours, the settling period in the tank would be 2.42 hours while 1200 population is connected with the sewers, and 1.45 hours when 2,000 are connected; while if all the sewage be assumed to reach the plant in 18 hours, the settling period would be 1.82 hours and 1.09 hours respectively.

One important and rather new feature provided in this tank, is an 8 in. drain just below the sludge outlet. The flow line of this drain is such that the sewage may readily be drawn below the slots in case it becomes necessary to work upon the walls of the settling chamber. It has been found in actual operation of Imhoff tanks in towns of the size of Montezuma, that not infrequently the sedimentation chamber is allowed to become completely sludged up and thus transformed into a small septic tank. In order to clean out the sedimentation chamber, it has been found necessary to lower the sewage below the slots and then force the sludge down through the slots, carefully squegeeing the walls and sloping aprons.

Prof. Dunlap gives the cost of the plant on the basis of $4.00 for labor per day of ten hours until late fall, after which the same was paid for eight hours; and teams at $7.00 per day of the same length. The length of haul from the railroad siding to the plant was 1.3 miles, over a fair road with no upgrades. Superintendence, overhead and profit are not included.

**Earth Work**

| | Type | Estimated cu. yds. | Cost per cu. yd. |
|---|---|---|---|
| Filter beds | Slip work | 1060 | $0.47 |
| Siphon chamber | ½ slip and ½ hand | 187 | 0.78 |
| Imhoff tank | Hand before banks caved | 408 | 0.82 |
| Imhoff tank | After cave-ins with bracing | 408 | 2.70 |

Sodding berms of filter beds, $0.20½ per sq. yd.

**Cost of 1:2:4 Concrete, per Cubic Yard.**

| | In Cylindrical Walls of Imhoff Tank | In Siphon Chamber Includes only walls and footings;; roof and floor omitted. |
|---|---|---|
| Cement, at 6.4 sacks per cu. yd. f. o. b. Montezuma ($2.28 per bbl.) | $ 3.65 | $ 3.65 |
| Hauling by team—to barn, 8½c., to job, 9c. | 0.18 | 0.18 |
| Sand, 0.45 cu. yd. at $2.65 | 1.19 | 1.19 |
| Gravel, 0.90 cu. yd. at $3.59 | 3.23 | 3.23 |
| Steel reinforcement | 1.49 | 1.59 |
| Setting forms and reinforcement | 2.93 | 2.18 |
| Mixing and pouring; heating sand, gravel and water | 1.98 | 1.65 |
| Total cost per cubic yard in place | $14.65 | $13.67 |

**Cost of Filter Sand and Gravel, per Ton.**

| | Filter Sand | Filter Gravel |
|---|---|---|
| Cost f.o b. sand company | $0.35 | $1.25 |
| Freight | 0.90 | 0.90 |
| Unloading from cars (mostly box cars) | 0.063 | 0.095 |
| Hauling by team 1.3 miles | 0.39 | 0.39 |
| Unloading from wagons | 0.022 | 0.022 |
| Leveling and spreading | 0.131 | .... |
| Total cost per ton in place | $1.86 | $2.66 |
| Total cost per cu. yd. | $2.78 | $3.59 |
| Total amount required for two beds | 1390 cu. yd. | 194 cu. yd. |
| Total required for sludge bed | 21 cu. yd. | 32 cu. yd. |

**Cost of 6 In. Vitrified Farm Drain Tile in Filter Beds.**

| | |
|---|---|
| Cost of tile per ft. f. o. b. Montezuma | $0.08 |
| Hauling by team 1.3 miles | 0.005 |
| Trenching | 0.039 |
| Laying | 0.01 |
| Graveling at $2.66 per ton and spreading at $0.04 per ft. | 0.44 |
| Total cost per ft. of trench | $0.574 |

**Laying 15-In. Vitrified Pipe Sewer Main, 1425 Ft. in Length.**

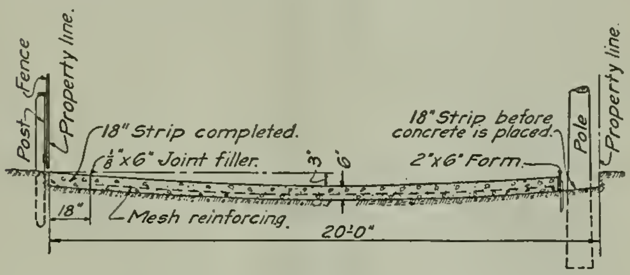
| | |
|---|---|
| Cost of pipe per ft. f. o. b. Montezuma | $0.65 |
| Hauling by team 1.3 miles | 0.033 |
| Trenching, including back-filling | 0.376 |
| Laying, including mortar | 0.077 |
| Total cost per ft. of trench | $1.14 |
| Cost of taking up old 15-in. sewer and back-filling per ft. | $0.246 |

## PAVING ALLEY WITH CONCRETE.

A method of overcoming some of the difficulties of paving alleys with concrete was worked out during the past year by Metzel & O'Hearn at Covington, Ky., and has been adopted as the standard for that city by H. G. Meiners, city engineer, and also by Joseph Herman, commissioner of public works, for the city of Newport, Ky.

The difficulties referred to were those of placing and finishing a pavement which extended entirely to the fences or buildings on each side in a continuous surface, securing a perfect flow line in the center (the alley pavement is dished), and meeting the further difficulty of poles set along the sides of the alley. It appeared impracticable to set side forms along the building lines, on which to slide a template, because there would be no place for the men to stand when striking off the pavement; the line of fences and buildings was quite irregular, some projecting over and others being back of the property line, while the concrete was to be carried into contact with each, and the telegraph poles would interfere.

These difficulties were met by setting the forms eighteen inches inside the building lines (which were eighteen feet apart) and finishing the fifteen feet width in the usual way, the finishers standing in these 18-inch strips while striking off with the template and using the roller and belt. When this concrete was three days old the side forms were removed and the side strips up to the buildings were laid, with a pitch of one inch to the foot; a strip of ⅛-inch expansion joint material being placed between each side strip and the 15-foot pavement first laid.



CROSS-SECTION OF COVINGTON CONCRETE ALLEY.

The pavements were six inches thick, mixed 1:2:3, nominally eighteen feet wide with a 3-inch fall from edge to center. They were reinforced with wire mesh.

Besides the advantage as a construction method, this plan offers the additional one that when buildings are to be rebuilt or new ones erected, the pavement can be broken out to the expansion joint and a new strip laid when the building has been completed, instead of roughly breaking off the pavement and patching it.

## WATER SUPPLY FOR THE CANTONMENTS.*

### Use of Wood Pipe for Distribution Systems—Details of Joints and Other Special Features—National Guard and Embarkation Camps.

#### USE OF WOOD PIPE.

To most of the engineers the use of wood pipe was unfamiliar, and standard details were worked out for the laying of this pipe and especially for connecting it up with the cast iron pipes and specials that were used in connection with it. Ordinarily the manufacturers of wood pipe supply castings with bells designed to fit the tenons of their pipe. Approximately 1,000 miles of wood-stave pipe were laid by the Construction Division and it was impossible to secure a sufficient number of special castings and machine them to fit the several sizes of tenons.

When the first orders were placed for wood-stave pipe, the office was informed that it was common practice to lead the tenons of the wood pipe to standard cast-iron hubs as ordinary cast-iron spigots are leaded in, but the various camps began reporting that this seemed to be difficult or impossible. Many methods were suggested for making the joints, but the best was suggested by Mr. Ramsey, engineer at Camp Meade, and another engineer (name not given). The success of this method depended largely on having all the tenons made small enough to provide proper lead space, and on having the diameter of the tenons accurately standardized. The makers of the pipe agreed to make their tenons of a specified standard dimension. As an illustration, for the six-inch pipe the minimum inside diameter of the cast-iron bell is 7.80 inches. For this size, the outside diameter of the wood pipe tenon was made 7½ inches. In order to make the joint, a cast iron plug was used which was 7 7/16 inches at the smaller end with a taper of 1/16 of an inch in 4 inches, the surface of the plug being smoothly turned. This plug was inserted in the cast iron bell and a lead joint poured and caulked lightly to insure a tight joint between the lead and the inside of the bell. The plug was then removed, leaving the lead in the bell. The tenon was then driven into the bell, having first been brushed with thin soft soap. If necessary, the lead joint was then caulked lightly. Where possible, the lead lining to the bell was prepared as above before the cast-iron pipe or fitting was lowered into the trench.

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*Concluded from Page 228.

In his discussion, Major Clarence Goldsmith, hydraulic engineer with the National Board of Fire Underwriters and principal assistant to Col. Maury, said that in order to assure tightness of the system, it was absolutely necessary to leave the trench open temporarily with only a small quantity of back-filling replaced over the pipes between joints (to prevent the line from floating in case the trench became filled with water) and to keep the pipe line filled with water under little or no pressure for several days in order to allow the staves to swell. The line was then tested with a pressure about fifty feet in excess of the working pressure and all leaks which developed were stopped by inserting plugs or wedges. It was desirable to have at least one man experienced in laying wood pipe to direct the work and repair leaks. If the leaks are not stopped before backfilling, the escaping jet of water frequently formed a sand-whirl, which quickly cut the wire and caused the complete failure of a section of pipe. In one case the sand-whirl cut completely through a one-inch corporation cock.

Service connections of fir pipe, which has a thick stave, were made by inserting a corporation cock with a wood thread into a hole of slightly smaller diameter which had been bored with a bit. The thickness of shell of redwood pipe is insufficient to afford holding power in all cases, and saddles were used, wound onto the pipe, provided with thread to receive the thread of the corporation cock. Instructions were to bore the holes, in the wood-stave pipe and insert the cocks before laying the pipe, so that splintering the inner end of the hole might be avoided and augur cuttings removed. For 2½-inch service pipe a 1½-inch corporation stop cock was used, and for a ¾-inch service pipe a ⅝-inch stop cock was used. A reducing coupling was used to connect the stop cock to the service pipe. No lead goosenecks were used and experience has shown that they were not necessary, and the saving of material and labor thus effected was considerable.

In order to conserve steel, redwood tanks of 100,000 and 200,000 gallons capacity were used in most cases for storage. These tanks could be shipped from California within a few hours of receipt of order and could be erected quickly, and they cost much less per gallon of capacity than either steel or concrete.

The use of wood stave pipe is estimated by Col. Maury to have resulted in large saving of money, although it was made compulsory by the necessity of conserving steel and iron and because it could be obtained more quickly than these materials. Generally speaking, much of the pine pipe manufactured east of the Mississippi proved unsatisfactory and not so good as the pipe from the Pacific coast. Of the latter, redwood proved to be superior to fir, and air-dried wood superior to kiln-dried. "Having in mind the fact that experience proved that wood pipe of good quality, properly laid, showed very little leakage, and that the life of such pipe thus laid may safely be taken at about twenty years, it would have been wise, in the writer's opinion, to use this pipe for the camps, simply on account of the saving in cost and time of delivery, even had there been no restriction on the use of cast-iron and steel pipe."

### NATIONAL GUARD AND EMBARKATION CAMPS.

Late in June, 1917, it was decided to construct sixteen tent camps for the National Guard troops, but by this time the orders for water works materials required by the cantonments had so exhausted the available stock and overtaxed the capacity of the various manufacturing plants that it was impossible for them to furnish any considerable quantity of similar materials within the time alloted. It was therefore necessary to use, if possible, materials that had not up to that time been drawn upon. It was decided to use six-inch wrought-iron steel pipe for distribution mains for eleven of these camps, six-inch cast-iron pipe for two camps in the Birmingham district and six-inch redwood-stave pipe for the two camps in California and one in New Mexico. The steel companies rolled and shipped 500,000 feet of six-inch steel pipe in a little more than six working days, and the cast-iron pipe manufacturers shipped about 80,000 feet of cast-iron pipe within a not much greater period; and a considerable part of the necessary material was on the way to the camps in practically all cases before any topographical maps of the camp site were available and in some cases before any quartermaster, engineer or contractor was on the ground.

The embarkation camps were designed with different sizes and groupings of buildings to a unit, and the typical layout of water mains was changed to suit these plans, the principal change being the use of three lines of mains instead of two through each unit. These camps were begun as the National Army and the National Guard camps were nearing completion.

As originally laid out the National Guard camps were designed to use tents, with no barracks and no sewerage systems. This meant that there was no necessity for providing the same standards of either fire protection or water consumption as for National Army camps, and an allowance of 30 gallons per capita was decided upon. The engineers anticipated, however, that there might ultimately be both barracks and sewerage systems, and the two lines of six-inch distribution mains running through each unit were laid along the outer edges of the units and in such manner that, when barracks were decided upon, the distribution system could be brought up to the requirements quickly by laying an additional main of larger size through the center of each unit.

Early in 1918 officers in charge of the Construction Division foresaw the probability of this change, but no official information to that effect was given out and no funds were available; but it seemed certain that when the orders did come the changes would have to be made in a hurry. With no appropriation and no authority the pipe could not be ordered, but the Division made its preparations by what might be considered a legitimate—and what proved to be a most fortunate—subterfuge. It placed an order for 300,000 feet of redwood-stave pipe of assorted sizes for the account of a large terminal project which had just been authorized and the funds of which were available. It was the intention to have this pipe actually shipped to this terminal and thereafter diverted, either in transit or by reshipment, to the various camps where it was anticipated it would be needed. In the meantime plans were prepared for reinforcing the distribution system and for such other changes in the camps as might be rendered necessary when the order came for converting them from tent camps to barrack camps. In August, 1918, the Construction Division was ordered to prepare immediately estimates of costs of such changes, and these estimates were delivered within two hours. Practically none of the pipe that had been ordered went to the terminal, but it was diverted in transit directly to the camps. A very serious delay was avoided by this action of the officers of the Construction Division.

### OTHER DETAILS.

Practically all of the regular service pumps used for the various supplies were motor-driven centrifugal. These were operated as a rule by purchased current. Not only were steam machinery and electric generators unobtainable—while electric motors and centrifugal pumps were obtainable on short notice—but the combination made the cheapest of all pumping units. At least one internal combustion engine was usually provided as a reserve against a breakdown in the electric service. Hub and spigot pipes and specials were used wherever possible in pumping stations instead of the flange pipe, which is ordinarily used, because the former gave greater flexibility for making connections, cost less and could be obtained more quickly.

In view of the size, character and distribution of buildings plenty of fire hydrants were provided so that there might be a large number of small streams with pressures sufficient to give good horizontal projection and so placed as to make it unnecessary to use hose lines longer than three hundred feet. The hydrant branches were made only 18 inches long and four-inch pipe used because of the reduced length. The hydrants contained two 2½-inch hose outlets. The nozzle tips were ⅞-inch in diameter. This combination provided a large number of streams quickly available through short lengths of hose and with first-class pressure.

In spite of the imperative demand for speed the sanitary quality of the supply was never overlooked, and in this the Sanitary Corps of the army and the Construction Division kept constantly in touch with each other, and when either noticed the slightest suspicion of danger of pollution it immediately informed the other and both united in a determined effort to remove it. Great care was exercised in selecting the sources of supply and in purifying the water wherever necessary; also all storage reservoirs were covered in order to prevent accidental or intentional pollution and the formation of algae. Chlorinators were furnished to all cantonments or camps even when the supply was considered to be normally safe. The use of wells in shallow strata, on inhabited watersheds, or in locations where it might be possible for the wells to become contaminated was prohibited. It was also prohibited to use any distribution mains for carrying polluted water for fire protection, industrial or any other uses, or to have in the cantonment any outlet or fixture from which such water might be drawn or any arrangement that would permit the later introduction of any such outlet or fixture. This last ruling was often difficult to enforce, but was always insisted upon.

In summing up, Mr. Maury stated that his office handled water supply problems on more than 275 different projects, involving the construction of about 1,100 miles of mains from six to thirty inches in diameter, 700 miles of service pipes from ¾ inch to 2½ inches in diameter, 650 million gallons per day in pumping capacity, 67 million gallons in capacity of concrete, steel or wood tanks, three billion gallons capacity in impounding reservoirs, and more than 40 million gallons daily capacity in filters. As to cost, he stated that the cost of reproduction new of an average water works system for a city of 40,000 inhabitants at present prices averaged more than $50 per capita, whereas the cost of water works of the cantonments, including service connections to within five feet of the buildings, has been less than $11 per capita, or about one-fifth as great. Possibly 25 per cent of this difference in cost is due to the use of wood-stave pipe instead of cast iron, the former costing about 60 per cent as much as the latter. Also the greater density of population in the camps aided in reducing cost; but when every possible allowance has been made the comparison is certainly favorable to the cantonment work.

Under the circumstances, however, time was even more important than cost; and with the most difficult material, labor and transportation conditions ever known in this country the water works for eighteen cantonments were planned and completed in a little over three months, while under ordinary circumstances three years would be required for planning and completing a water works system for a city of 40,000 population.

Practically all the engineers who engaged in the discussion of this paper paid high tribute to Colonel Maury and the part which he had played in securing the results of which the entire service was proud.

George A. Johnson was first in charge of the water and sewerage section of the Maintenance and Repair Division, and later was assistant to the officer in charge of that division; and he states that it would be natural to suppose that, given the condition of construction, there would be inadequacies, inapplicable features of importance and structural inferiorities which would show up in operation of the systems. He testifies, however, that the water systems in all of the military establishments were equal to the demands made on them, and that, although built in a mere fraction of the time usually required for such work and called on to function satisfactorily from the start, they did just that, and it was little short of a miracle that they did. As to the speed secured by the Construction Division, Mr. Johnson said that "probably no such aggregation of 'go-getters' and 'do-it-nows' was ever before brought together," and all labored unselfishly to serve their country first, last and all the time. Rear-Admiral F. R. Harris, located at Norfolk, described the difficulties that were encountered by the rapid and enormous development of Government work in that vicinity, one of the most serious of which was the water supply. Colonel Maury, as advisory engineer in general charge of the water supply development of the cantonments, was not responsible for any of this work; but Rear-Admiral Harris had been so impressed at a conference in Washington with his thorough knowledge of local conditions and his general efficiency that he advocated that this work be intrusted to the Construction Division of the army with the understanding that Colonel Maury was to give it his general supervision, and stated that the work was taken up by Colonel Maury and has been well carried out to his great credit and that of the organization of which he was the head.

## PAVING PRICES IN NEW ORLEANS.

Bids for paving twenty-two streets in New Orleans were received early in October. Five of these were for either wood blocks or granite; thirteen for either asphalts or bitulithic, and four for either gravel or chert. Comparing the lowest bids on each street, reducing the differences to percentages and averaging these, we find the following:

The prices for granite exceeded those for wood block by from 9% to 13%, averaging 11½%. The prices bid for asphalt exceeded those bid for bitulithic by from 2½ to 7%, averaging 4⅓%. Gravel was 2% less than chert in three cases and 24% less in the fourth.

## LEGAL NEWS

### A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

### Force of Special City Charter.

(Tex. Civ. App.) Provisions of the city charter specially granted to city by Legislature have the same force and effect as any other positive statutory law of the state.—Cawthon v. City of Houston, 212 S. W. 796.

### Action to Enjoin Tax Bills—Contractor Interested Party.

(Mo. App.) In owner's action to enjoin issuance of special tax bills for construction of pavement and delivery thereof to contractor, the contractor is the real party interested and a necessary party to the suit.—Wegenka v. City of St. Joseph, 212 S. W. 71.

### City Council Independent of Courts.

(Tex. Civ. App.) A city council, when acting upon subjects over which it has the power to legislate, is an entirely independent lawmaking body, and cannot be interfered with or subjected to inquiry by the courts as to its motives, reasons, or purposes in enacting ordinances.—Houston Electric Co. v. City of Houston, 212 S. W. 198.

### Damage For Delay in Waterworks Contract—Final Estimate.

(N. Y. Sup.) Where, on completion of a contract for construction of a portion of a waterworks system, the final estimate prepared by the engineers of the municipal water board stated that it did not include any claims which might be presented by the board direct, and made no provision as to damage for delay, which claim was presented by the board direct, held that the final estimate neither included such claim nor precluded the water board from offsetting it against the contract price.—People ex rel. Fidelity & Casualty Co. of New York v. Joslin, 177 N. Y. S. 42.

### Reasonable Public Use of Street—Franchise Rights.

(W. Va.) A city acquiring a public street, acquires an easement for every kind of travel, and transportation which is reasonable and proper, and every other reasonable means of transportation beneath the surface, and reasonable use for wires of telegraph, telephone, and electric light companies.—Fox v. City of Hinton, 99 S. E. 478.

Right to use of city street for transmission of electric current for use of its inhabitants may be granted by city to public service corporation organized for that purpose, upon which such public service corporation will have same rights in streets for such purpose as city would have had, had it undertaken work itself.—Id.

### Bids on Void Specifications Are Void—Local vs. High Bidder.

(N. Y. Sup.) Where specifications, on the basis of which bids for city contract were submitted, were void, the bids submitted were void.—People ex rel. Haecker Sterling Co. v. City of Buffalo, 176 N. Y. S. 642.

An action at law by the lowest bidder for city contract to recover damages, where contract has not in fact been awarded to him, cannot be maintained, except in those cases where by peculiar provisions of the charter the statute itself expressly confirms the contract to the lowest bidder.—Id.

The awarding of contract to furnish city with nine tractors for use in connection with flusher trailers in cleaning streets to manufacturer of the tractors then in use by city, for the purpose of securing standardization of parts, instead of to lowest bidder, whose tractor was assembled, was made in good faith and not arbitrarily.—Id.

That corporation bidding for city contract is a local industry, spreading a large pay roll over city, is not a sufficient reason for awarding contract to such corporation. instead of to a lower bidder.—Id.

In advertising for bids for city contract, the making of specifications which would exclude competition is a plain violation of the statute.—Id.

### Salary of Discharged Fireman.

(Pa.) Where city fireman was found guilty by a fireman's court of charges preferred against him and discharged, from which action there was no appeal, and was thereafter reinstated by a similar court on rehearing of charges, he could not recover salary which would have accrued between discharge and reinstatement, as discharge terminated his employment, and as a subsequent re-employment was a new contract creating new duties and having no relation to former contract.—Winch v. City of Philadelphia, 107 A. 217.

### Prohibiting Moving of Garbage Through Streets—Police Power.

(Mass.) Boston Revised Ordinances 1914, c. 40, § 14, providing that no person shall transport kitchen swill or garbage through the alleys or streets of the city, municipal collection and removal of the entire mass of garbage being necessary to preserve the public health, passed by the board of health under the authority of Rev. Laws, c. 75, § 65, is a valid exercise of police power by the city, justifying the refusal of permits to farmers to convey garbage and swill through the streets.—Wheeler v. City of Boston, 123 N. E. 684.

### Petition for Paving—Duty of Commissioners.

(Tex. Civ. App.) Where a city charter made it the duty of the board of commissioners to order a street paved whenever the owners of 60 per cent. of the property abutting thereon should present a written petition therefor, and provided that assessment should be paid in five installments, and a petition for paving signed by the owners of more than 60 per cent. was filed, the board of commissioners cannot disregard it, and, acting under their general authority, order improvement and provide for payment of the assessment within 30 days after acceptance of the work.—Wooten v. Texas Bitulithic Co., 212 S. W. 248.

### Power of Mayor to Engage Private Detectives—City Liability for Contract for Services.

(Idaho) Under Comp. Laws, § 148:60 (Sess. Laws 1913, c. 74, § 27), the action of council of Boise City, ratifying or attempting to ratify mayor's act in engaging private detectives to aid in prosecuting violation of ordinances and ordering claims for such services, was void.—Tate v. Johnson, 181 P. 523.

The mayor of a city governed by Comp. Laws, §§ 162:1—162:127 (Sess. Laws 1911, c. 82), the Black Law, or Commission Government Act, has no power to engage services of private detectives or aid in discovering and prosecuting alleged violations of city ordinances, in absence of authority granted by city council.—Id.

A city cannot be held liable under an implied contract for services, where power to make an express contract therefor is wanting.—Id.

### Power to Furnish Water Outside Municipality.

(N. J. Ch.) Under Act March 27, 1917 (P. L. p. 429) art. 32, a municipality, as consideration for grant to it of a right of way for its pipe lines in another municipality, may agree to and actually furnish water to owners of tract through which pipe lines run, without consent of other municipality.—Town of Kearny v. City of Bayonne, 107 A. 169.

Act Oct. 11, 1907 (P. L. p. 677) J 2 does not forbid the obtaining of water by an inhabitant of a municipality from another municipality without the consent of the first municipality.—Id.

A municipality's contract to furnish water to owners of tract through which pipe line right of way and to make agreements necessary therefor, and furnishing of water under such contract is not a doing of a water business within Act March 27, 1917 (P. L. p. 438) art. 32, § 16, or Act Oct. 11, 1907 (P. L. p. 676).—Id.

Power in a municipality to furnish water to its inhabitants must be rested upon direct legislation.—Id.

The grant of power generally to provide a water supply for the inhabitants of a municipality does not carry with it the right to furnish water to inhabitants of other territories.—Id.

# MUNICIPAL INDEX

*(Continued from last week's issue)*

The Bear River Bridge. Proximity of old bridge; layout of work; under-water pile driving prevented interruption of work. By A. T. Macdonald. Paper before Engineering Institute of Canada. 2500 words. Canadian Engineer, Sept. 18, Toronto, Ont.

Concrete Ties Hold Together Walls of Bridge Approach Fill. On account of high ground on line of bridge, fill was not as great as showing face of thin outer walls used. 2 ills., 600 words. Engineering News-Record, Sept. 12, New York.

Highway Bridge Floor Replaced After Corrosion. Pottstown bridge over Schuylkill river a typical case of deteriorated floor system; new steel protected; lower chords open. 2 ills., 2200 words. Engineering News-Record, Sept. 18, New York.

**Other Structures:**

Extending Galveston Sea Wall. Two-mile addition to famous concrete protecting wall is being built with maximum use of mechanical aid. By J. B. Lippincott, consulting engr., Los Angeles, Cal. 7 ills., 1600 words. Engineering News-Record, Sept. 25, New York.

Preliminary Work for Construction of 1,000 Foot Concrete Arch at Montgomery, Pa. 2 ills., 600 words. Engineering and Contracting, Sept. 24, Chicago.

Viaduct Protected from Snowslides by Concrete Walls. Slides damaged tower columns in Cascade mountain gorge; bases of shore bents incased in concrete. By E. E. Adams, ass't engr., Great Northern Railway Co., Seattle, Wash. 3 ills., 1000 words. Engineering News-Record, Sept. 4, New York.

Concrete Wall Construction Is Continuous Process. Trenching, sheeting and bracing, piledriving, form-setting and concreting outfits move in procession. 4 ills., 1100 words. Engineering News-Record, Sept. 4, New York.

Wind Pressure on Cylindrical Structures in Practice. Methods applicable to various problems of structural designer in dealing with chimneys, stacks and standpipes; proportioning anchor bolts; guyed steel stacks. By R. Fleming, American Bridge Co., N. Y. C. 4500 words. Engineering News-Record, Sept. 11, New York.

Deflection of Continuous Beams and Rigid Frames. Tabulated factors facilitate computation of maximum deflection; approximation for unsymmetrical loading. By F. E. Richart ,engrg. experiment station, University if Illinois, Urbana. 3 ills., 1000 words. Engineering News-Record, Sept. 18, New York.

Fatigue Phenomena in Metals. Localized stresses under static loading and under impact loading; tests and criteria for fatigue strength; formulae for producing parts subjected to repeated stress. 1 chart, 4500 words. Engineering and Contracting, Sept. 24, Chicago.

## MISCELLANEOUS.

Town Planning in Eastern Canada. 47 municipalities in Ontario have already appointed housing commissions and applied for loans. From "Conservation of Life," published by Commission of Conservation, Ottawa. 700 words. Canadian Engineer, Sept. 4, Toronto, Ont.

Observations on Government Housing, and on Town Planning and Housing in General. 1600 words. Engineering and Contracting, Sept. 24, Chicago.

Scope of New Iowa State Housing Law. Summary of the provisions of the law. By Dr. C. W. Reese, state commissioner of housing. 1500 words. American City, September, New York.

Sanitary Association of Scotland. Annual congress at Perth. Present deplorable condition of housing in Scotland; discussion on disinfection: provision of water and drainage for housing schemes to villages in rural districts; salvage of town refuse. Sept. 11. 1200 words. Sept. 18, 1000 words. Municipal Engineering and Sanitary Record, London, England.

Protection of Owners on Cost-Plus Contracts. Practical use of Dewey decimal system in keeping books on the job; open for inspection hy owners and their engineers and architects; distribution of accounts; classification of plant expense and field overhead. By F. A. Wells, vice-pres., Wells Bros. Constr. Co. of Canada, Ltd. 4 ills., 2500 words. Canadian Engineer, Sept. 24, Toronto, Ont.

The Kelley System of Payment to Contractors for Estimating. Definite schedule of charges; results of week's operation; weakness of system. From report of Committee on Methods of Asso. General Contractors of America. 2500 words. Canadian Engineer, Sept. 18, Toronto, Ont.

Suggested Form of Cost-Plus Contract. Cost plus unit profit insures contractor against loss and at same time protects owner. By G. H. Hailey, consulting engr.. Cincinnati, O. 1500 words. Engineering and Contracting, Sept. 17, Chicago.

Cost-Plus-Fixed-Fee Contract. Building construction a huge gamble except under this form of agreement; co-operation for better building, plus greater speed and security. By A. E. Wells, pres., Wells Bros. Construction Co. 1200 words. Canadian Engineer, Sept. 11, Toronto, Ont.

Discrepancies in Tendering. No excuse for a two-to-one discrepancy; variation should not exceed 20 per cent; editorial. 550 words. Municipal Engineering and Sanitary Record, Sept. 4, London, Eng.

Awarding Contract to Informal Bidder. Editorial comment on the awarding of a contract to an informal bidder after formal bids had been opened. 200 words. Municipal Journal and Public Works, Sept. 13, New York.

Cost Keeping Under Cost-Plus-Fixed-Fee Contracts. Office routine of purchase order, invoices and voucher; distribution of accounts; classification of plant expense; field overhead. By F. A. Wells, vice pres. and treasurer, Wells Bros. Constr. Co. Chicago. 4 ills., 2700 words. Engineering and Contracting, Oct. 15, Chicago.

The Case Against Payment to Contractors for Estimating. Competition vs. Speculation; objections to "payment;" quantity expense real factor. By Wm. G. Smith, pres., Quantity Survey Co., N.Y. 2000 words. Canadian Engineer, Sept. 25, Toronto, Ont.

Contracts—A Comparison of "Cost Plus" with Other Forms. Paper before American Society of Civil Engineers printed in the Proceedings, by E. W. Clarke. 2500 words. Engineering and Contracting, Sept. 3, Chicago.

Municipal Markets. Open markets in 116 cities and inclosed markets in 56; incomes and expenses; officials in charge; structures and furnishings; rental charges; products sold. 1 ill., 3000 words. Municipal Journal and Public Works, Sept. 6, New York.

Municipal Markets. Products sold in the several markets; sizes of markets, rental charges in open and inclosed markets. (Concluded.) 900 words. Municipal Journal and Public Works, Sept. 13, New York.

Public Markets and the H. C. of L. Editorial reference to article in this issue on how several hundred public markets are run. 100 words. Municipal Journal and Public Works, Sept. 6, New York.

Drainage Works of the Rio Grande Irrigation Project. Elements of design, methods of ditch construction with dragline excavators on caterpillar tractors, and details of cost; over 15,000,000 cubic yards of excavation involved at cost of about $3,500,000. J. L. Burkholder, drainage engr., U. S. Reclamation Service, Denver, Colo. 4 ills., 3 tables, 6500 words. Engineering News-Record, Sept. 18, New York.

State and Federal Control of Land Drainage Needed. Control by districts does not meet larger problems; systematic study and high engineering ability required. By A. M. Shaw, consulting engr., New Orleans, La. 2000 words. Engineering News-Record, Sept. 11, New York.

Most Recent Developments in Methods of Measuring Irrigation Water to Farms and Irrigators. By F. E. Trask, C. E., cons. civ. and hydraulic engr. Los Angeles, Cal. 3 ills., 800 words. Municipal and County Engineering, September, Indianapolis, Ind.

Operation Methods and Results on Lindsay. Strathmore Irrigation District. Well tests and reconstruction; operation results of well and main pumping plants; water-hammer in wood pipe lines; repairs to steel pipes; gravity and pressure consumers' meters. By E. Court Eaton, supt., Lindsay--Strathmore Irrigation Dist., Lindsay, Cal. 5600 words. Engineering News-Record, Sept. 4, New York.

Cost of Irrigation Work for Maintenance and operation of Large Irrigation Project. By H. M. Chadwick, ass't chief engr., Valier-Montana Land and Water Co. 2 ills., 1700 words. Engineering and Contracting, Oct. 8, Chicago.

Engineering Standards Committee Proposes New Constitution. New draft provides for taking in other societies on equal basis; association plan for outside financing dropped. 2000 words. Engineering News-Record, Sept. 18, New York.

Present Status of Engineering Association Standards. Partial summary of progress which has been made in development of standards, recommended practices and miscellaneous methods and practices. "Buildings and Structures" and "Way Matters" by R. C. Cram; "The Wheel Situation" by H. L. Brown; "Mowing Weeds on Interurban Right-of-Way" by E. Main, chief engr., Rockford & Interurban Railway. 3000 words. Electric Railway Journal, Sept. 20, New York.

Municipal Engineers or Outside Engineers. Nothing short of sheer robbery for public bodies to take over a consulting engineer's report and plans and allow them to be carried out by their own surveyor. Letter to editor. 1100 words. Municipal Engineering and Sanitary Record, Sept. 4, London, Eng.

Problems Confronting Municipal Engineers. Supply of materials; labor difficulties. Excerpts from presidential address before Conference of Engrs. & Surveyors, at Newcastle, England, by C. Brownridge, boro engr., Birkenhead, Eng. 1000 words. Canadian Engineer, Sept. 4, Toronto, Ont.

Classification of Engineering Positions in State, County and City Service. 1000 words. Engineering and Contracting, Sept. 3, Chicago.

Industrial Viewpoint on Standardization. Experience of engineer who is user of electrical equipment emphasizes economies that come from fixing standards. By E. E. George, electrical engr., Chicago, Ill. 2500 words. Electrical World, Sept. 20, New York.

Municipal Forestry in Pittsfield, Mass. White pines are recommended despite the blister rust. By J. B. Woods, valuation engr., Treasury Dept. 3 ills., 2300 words. American City, September, New York

Portable Piledriver Has Many Uses. Perfected by Capt. A. M. Bellony, Engineers, U. S. A. 1 ill., 500 words. Engineering and Contracting, Sept. 17, Chicago.

Arrangement of Equipment in Engineer's Office. Adjustable table, lights and dictionary stand; special cases to protect instruments; generally neat appearance. By H. P. Farrow, C. E., Belfast, Me. 4 ills., 700 words. Engineering News-Record, Sept. 11. New York.

National Public Works Department Versus Corps of Engineers. Passage of Jones-Reavis bill urged on ground that great harm would result from injection of military system into activities of civil life. By I. Randolph, consulting engr., Chicago. 1500 words. Engineering News-Record, Sept. 18, New York.

Piece Work Versus Day Labor in Hand Excavation. Itemized costs of both. By E. N. Bryan, chief engr., Waterford Irrigation District, Waterford Cal. 2000 words. Engineering and Contracting, Sept. 17, Chicago.

Widened Channel Reduces Flood Hazard at Columbus. Scioto river set between earth levees 580 feet apart; over 200 structures wrecked for new $3,500,000 floodway. 2 ills., 1600 words. Engineering News-Record, Sept., 11, New York.

Fire Ladder in Surveying Work. 25 triangulation stations established, located near new boundary line of Baltimore. 150 words. Municipal Journal and Public Works, Sept. 27, New York.

Spanish Engineer Desires Municipal Reports. City Engineer of Barcelona endeavoring to secure copies of technical reports of American municipalities. 100 words. Municipal Journal and Public Works, Sept. 27, New York.

Unit Costs for Use in Public Utility Appraisals. Recent high prices increase differences in valuation already so divergent as to confuse courts; effect of choice of periods if average prices are used is important. By R. L. Baldwin, Burns & McDonnell, consulting engrs, Kansas City, Mo. 1 chart, 2600 words. Engineering News-Record, Sept. 11, New York.

What Can Be Done to Accelerate Municipal Improvement? Deflate currency and bank deposits so as to increase buying power of dollar and increase borrowing power of municipalities. 600 words. Engineering and Contracting, Sept. 3, Chicago.

*(Continued on page 248.)*

# NEWS OF THE SOCIETIES

Nov. 12-14.—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Springfield, Ill.

Feb. 9-13, 1920.—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention, Louisville, Ky. Secretary, E. L. Powers, 150 Nassau street, New York.

## Engineering Institute of Canada.

The three-day session of the fifth general professional meeting of the Engineering Institute of Canada was held at St. John, New Brunswick, Sept. 10-12.

One of the papers was read by C. O. Foss, chairman of the New Brunswick Water-Powers Commission, who outlined comprehensively the possibilities for hydro-electric development in New Brunswick.

Other papers and discussions included those on highway construction and bridge work, experimentation with high-tension, high-frequency electric current, engineering problems connected with the use of telephone cables, and heating problems produced by some of the modern methods of building construction. During the meeting trips were made to manufacturing plants and points of general engineering interest.

The sessions were presided over by the president Lieut. Col. R. W. Leonard.

## American Association of Engineers.

The American Association of Engineers recently issued the following "call to unity of the Profession."

"Unity of the engineering profession used to be desirable. Now it is a necessity, not only that the profession may retain its identity, but that it also may take the place in society which we think it should occupy. Unity can be accomplished, and that quickly, if we will but thoughtfully face the facts before us.

"The engineering profession today faces the danger of being submerged in the controversy between capital and labor. In its position between capital and labor the profession should be represented as a matter of course at the White House Conference in October. Any invitation that may be received will come, however, only on request, and the engineer who attends will be regarded only as an onlooker. We can have a voice and be heard only by presenting a united front.

"We say the engineer won the war. So must he win the battles of peace and take his part in the industrial readjustments where now justice, liberty and patriotism are swept aside in the struggle between capital and labor. As it is, organized labor seeks to divide the profession into the employer and employee classes. No calamity greater than this could befall the profession except to have it owned and at the behest of capital. The engineer's place has aptly been characterized as the third leg of the tripod on which modern industrial civilization rests. He belongs neither to capital nor to labor, but uses each for the purpose of accomplishing the greatest production for the happiness of mankind.

"If he uses capital and labor to produce for the enjoyment of all men, why should he not plead the case of the neglected major third party, the public, in the struggles climaxing in the steel strike?

"It can be done. Unity is close at hand."

The following resolution was drafted for presentation to the Board of Directors of the American Association of Engineers at its meeting on October 11.

Resolved—That the Board of Directors of the American Association of Engineers call a conference of representatives of all organizations or societies of engineers, architects and similarly educated or experienced technical men, for the purpose of strengthening the position of engineers and technical men as a group distinct from labor and from capital but essential to both and to society in general, because of the fact that stability of the social structure resting on the tripod of labor, capital and engineering, is dependent upon the strength of this third support.

# PERSONALS

Harry Barker and Robert C. Wheeler announce their association for the practice of engineering and the establishment of an office at 1512 Maiden Lane Building, 170 Broadway, New York City. Mr. Barker has recently been released from military service as Captain of Engineers, U. S. A., but Major Wheeler will remain in the service for a short time as Chief of the Water Supply Section of the Construction Division of the Army. Mr. Barker will be the active director of the firm's work until the release of Major Wheeler. Special attention will be given to public utility engineering, including valuations, rates, operation and management; to hydraulics; to power development and utilization; water supply and purification; sewerage and sewage disposal; municipal problems including city transportation and civic improvements; development of new processes; and reports for investors.

Mr. Barker is a graduate engineer (University of Vermont), with over fifteen years broad experience in electrical, mechanical and civil fields. His earlier work included design and testing of power plants, and field and laboratory work in hydraulics. For several years he was an editor of "Engineering News" and "Engineering News-Record." From the early days of the present form of utility regulation he has been consulted in public utility matters and much of his experience has been collected in the treatise "Public Utility Rates." In 1917 Mr. Barker was called from reserve to active military service, being assistant engineer depot officer at the New York Port of Embarkation, and an engineer of camp maintenance and utility operation in the Cantonment and Construction Divisions.' After the armistice he was given leave to become associated with Mr. George W. Fuller, member of the Engineers' Valuation Board for the Pittsburgh Railways, which Board assisted the Pennsylvania Public Service Commission in the valuation of the 600-mile street and interurban railway system of the Pittsburgh District.

Mr. Wheeler is a graduate engineer (University of Vermont), who has specialized for ten years in the design, construction and operation of water supply and purification plants, sewers and sewage disposal works. His earlier work was in railroad construction. For over five years he was associated with Mr. George W. Fuller, being particularly identified with the water works and sewerage improvements at Clarksburg, W. Va., the sewerage and sewage disposal works at Vincennes, Ind., and those for Plainfield, North Plainfield and Dunnellen, N. J. Later he served a term as City Engineer for Summit, N. J., and then became General Manager and Chief Engineer of the New Chester Water Co., of Chester, Pa., and its subsidiaries, the Greencastle Water Co., Greencastle, Ind., the Vincennes Water Supply Co., Vincennes, Ind., and the Delaware Water Supply Co., Delaware, Ind. This office he resigned in August, 1918, when commissioned Captain in the Construction Division of the Army. He served as Assistant Port Utilities Officer at Newport News, Va., and in June, 1919, was promoted and assigned as Chief of the Water Supply Section.

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Wills, Wirt J., after having been chairman of the water commission of the Memphis, Tenn., artesian water department for six years, and general superintendent for the past seven and a half years, has tendered his resignation to take effect Nov. 1. Mr. Wills is patentee of the "Wills Pumping System" and will devote his entire time hereafter to the manufacture of these pumps.

Colony, S. E., Renovo, Penn., has been made borough engineer of Ridgway, Penn. He was formerly borough engineer for Renovo.

Browne, Charles A., of Orlando, Fla., division engineer for the state road department, has been appointed state highway engineer of Florida, succeeding William F. Cocke, resigned.

Gray, Harold F., former district health officer, Chico, Calif., has been appointed state sanitary engineer of New Mexico, with headquarters at Santa Fé.

Hartung, Paul, deputy county engineer of Jackson County, Missouri, has been appointed engineer of sewers, succeeding A. D. Ludlow, who recently resigned the former office.

# NEW APPLIANCES

**Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.**

## GAUNTT CHEMICAL FEEDER.

### For Continuous Treatment in Water Purification Plants.

The application of chemicals in water treatment by means of solution tanks requires much attention on the part of the operators and takes up space in the plant. Results, too, are not always satisfactory, because some chemicals are wasted and it is much harder to maintain the quality of water.

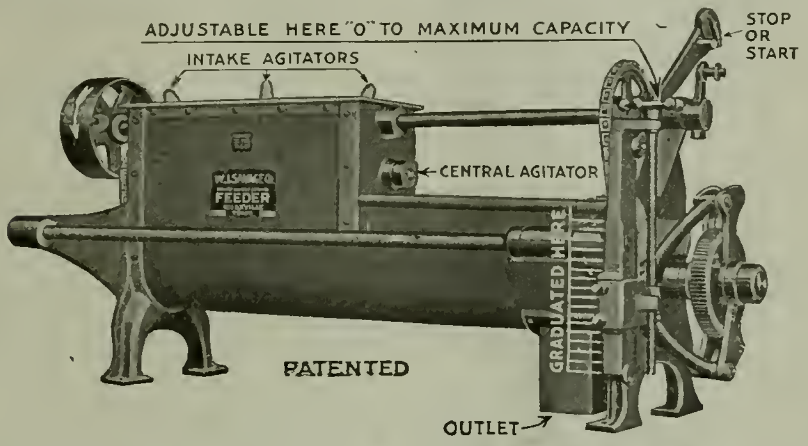
These difficulties may be eliminated by the use of mechanical feeding devices and mixers adapted to applying lime, iron, soda ash, etc., continuously.

The Gauntt feeders are made in two types—cylinder and conveyor—the former adaptable for feeding all chemicals in lump form, in sizes up to and including three inches in diameter and the latter for feeding all pulverized chemicals. The cylinder type is made in two sizes: 14-2 and 14-3, with capacities of 400 and 750 lbs. per hour. The conveyor type is made in three sizes: 4, 6 and 9, with capacities of 300, 800 and 2,000 lbs. per hour respectively.

These feeders are adjustable instantly from zero to maximum capacity while in operation, and produce a steady and continuous flow of the chemicals. They may be operated by any suitable source of power.

The Gauntt mixers for iron, alum and soda ash are all alike, those for lime being of a different design. These mixers dissolve the chemicals without the use of mechanical stirrers and solution tanks. They are all equipped with steel hoppers and cast iron mixers to properly handle the chemicals for which they are intended. The hoppers are so designed as to prevent any choking or bridging over.

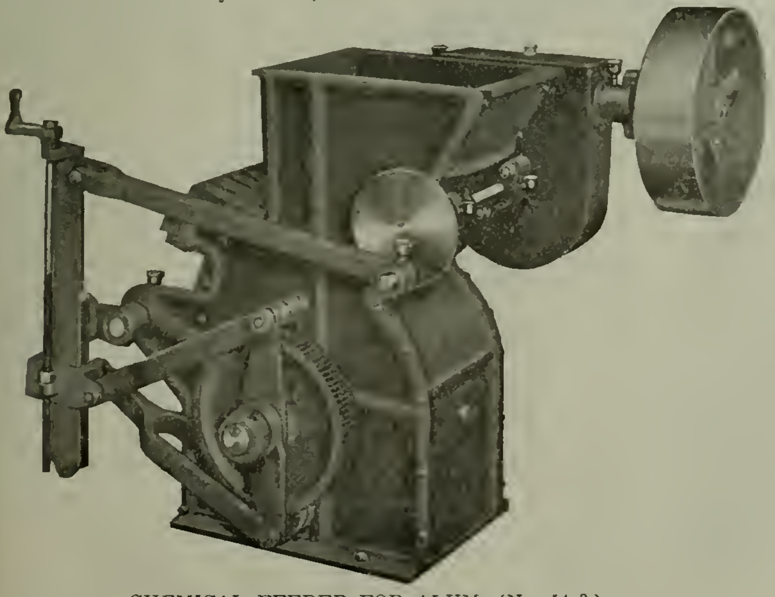
Feeding chemicals mechanically makes for more perfect control of treatment, with a better quality of effluent water resulting. Operation is more reliable and requires less labor and attention. Power and upkeep costs are also reduced. In some plants the elimination of unsightly tanks and the consequent saving of space are an advantage. Treatment is independent of temperature or velocity of water. Chemical feed lines are simplified. No agitators are required. It is estimated that the saving of chemicals will in many cases amount to over 10 per cent and the labor saving to 50 to 75 per cent, depending on the plant.



FEDER FOR LIME, IRON AND SODA ASH (NOS. 4, 6 AND 9.)

After a year's continuous operation of a Gauntt chemical feeder in the Knoxville, Tenn., water department, Jas. O. Crumbliss, commissioner, reports: "Before we installed this chemical feeder we were using tanks to dissolve the alum, and feeding the solution through an orifice. The tank system required a great deal of attention, was somewhat wasteful, and the orifice gave endless trouble. The chemical feeder is more compact, does not require any more power to operate, cuts down the alum bill and gives the operator more time to see after other things. It eliminates all trouble of dissolving the chemicals in cold weather, has an easy and positive control for various amounts of the chemicals required and also enables us to give the people a more uniform good quality of water."

The Gauntt feeders and mixers are made by the W. J. Savage Company, Knoxville, Tenn.



CHEMICAL FEEDER FOR ALUM. (No. 14-2.)

## INDUSTRIAL NEWS

### Van Wie Pump Company Sold to the East Iron & Machine Company.

The Van Wie Pump Company of Syracuse, N. Y., successor to the Baldwinsville Centrifugal Pump Co., established in 1860, has sold its business—drawings, patterns, good will, etc., to The East Iron & Machine Co., Lima, Ohio. With this change the oldest centrifugal pump manufacturing concern in North America retires from the field. The business was established at Baldwinsville, N. Y., in 1860 and was first conducted by White, Clark & Company. Later, the name was changed to the Baldwinsville Centrifugal Pump Co. In 1880 the factory was removed to Syracuse, N. Y., and in 1905 it was incorporated as the Van Wie Pump Company.

The line manufactured includes vertical and horizontal centrifugal pumps, double suction pumps, sand pumps, hydraulic dredge pumps, single acting triplex pumps and vertical steam engines. It includes pumps suitable for, and adapted to, every industry where pumps are used—contractors, irrigation, mills, factories, dry docks, water works, dredges, etc. Thousands of these pumps of various types are in use throughout North America, and are now operating in many of the largest plants and industries.

The East Iron & Machine Company at its plant in Lima will at once begin to manufacture the entire line, as well as make parts and repairs for all Van Wie products. It is also its intention to make improvements on several of the pumps, which will greatly increase their efficiency. Their engineers are now working on this.

Established in 1903, the East Iron & Machine Company has had a strikingly successful development. It builds Merriman Steam Melting Asphalt Plants and complete lines of machinery for chemical, food and allied industries.

### Railroad Administration Asks Cooperation.

Walker D. Hines, Director General of Railroads, authorized the following statement, asking the further cooperation of shippers and receivers of freight in promoting freight car efficiency:

"During the war, no one was more patriotically helpful than the American shipper. With zeal and efficiency he did his part in the common cause. The Railroad Administration had excellent opportunity to observe this attitude during the war and has appreciated heartily the subsequent continued cooperation of the great majority of the shippers. The time has now come for renewed efforts by both the Railroad Administration and the shippers and receivers of freight so that the nation's transportation service may be rendered with the greatest satisfaction possible under the circumstances.

"An unusually heavy grain and coal movement, deferred repair and the construction of public highways in all sections of the country and the concentrated requirements of suddenly reviving business, combined with the usual transportation requirements at this time of the year, threaten a serious lack of transportation facilities unless all parties interested cooperate in securing the greatest possible utility from the existing limited transportation facilities.

"The Railroad Administration will do its full part. The Car Service Section in Washington and the various regional organizations are striving earnestly to secure a fair and just distribution of the existing equipment as well as to meet the requirements of individual shippers. Of the 100,000 new freight cars which the Railroad Administration ordered constructed, 59409 had been completed on September 13, and are now in service, and this number is being increased at the rate of over 900 each working day. Instructions have been issued to all Regional Directors to bend every effort to speed up road and yard movements, to secure heavier loading equipment, to establish and maintain complete and accurate yard checks, to reduce the number of bad order cars, to make prompt delivery to connections, to effect early deliveries at freighthouses and teamtracks, to reduce the number of freight cars used in the transportation of company material and to expedite the movement of grain cars in terminals. The hours of labor of car shop employes have been increased and every effort is being made, both in railroad shops and in the shops of private concerns to whom the work is being let out, to reduce the number of bad order cars.

"Shippers of freight can assist.

1. By loading all cars to full visible or carrying capacity.
2. By prompt loading and release to the carrier.
3. By ordering cars only when actually required.
4. By eliminating the use of railway equipment in trap or transfer service when tonnage can be handled by motor truck or wagon.
5. By reducing the diversion and reconsignment of cars to a minimum.

"Receivers of freight can assist

1. By prompt unloading of cars and notice thereof to the carrier.
2. By ordering goods in quantities representing the full safe carrying capacity of cars and disregarding trade units.
3. By ordering from the nearest available source.
4. By pooling orders so as to secure full car load.

"A resumption of intensive loading will not merely reduce the number of cars under load but will also relieve congested terminals where it is a question of track room rather than of equipment."

### Asphalt Association Appoints New Engineers.

Walter E. Rosengarten has resigned his position as highway engineer in the United States Bureau of Public Roads to accept the position of traffic engineer with the Asphalt Association and will make his headquarters at 15 Maiden Lane, New York.

At his new post Mr. Rosengarten will deal with the very difficult and pressing problems of co-ordinating the design of the various highway types with the requirements of modern traffic. In specializing along these lines the Asphalt Association has shown its appreciation of the fact that the traffic of America's 7,000,000 motor vehicles including some hundreds of thousands of heavy trucks calls for a keen and appreciative study of the forces which on the one hand tend toward the deterioration of the highway and on the other hand toward increasing operating costs and the deterioration of the motor vehicle itself.

Mr. Rosengarten is considered particularly fitted for his new post by reason of the fact that since his graduation from the engineering department of the University of Pennsylvania he has had a combination of practical highway construction experience and research study with both the University of Pennsylvania and the U.S. Bureau of Public Roads. He was with the Federal Bureau about eight years during which he spent about four years in practical highway construction, about two and a half years in the research and testing division in connection with laboratory and field work.

Captain Robert B. Murdock, who has recently returned from military service in France, has been appointed executive engineer with the Asphalt Association. He will directly assist the secretary of the Association in developing the organization and operating policy.

Captain Murdock has had an extensive experience in practical highway work during the course of which, as resident engineer he had charge of the construction of one of the most difficult portions of the Columbia River highway including the famous figure "8" section at Crown Point near Portland, Oregon.

Later he was made assistant state highway engineer of Oregon and held that office until he entered the military service.

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Dutch East Indies Offer Many Construction Opportunities. Developments now under way or in prospect in Sumatra and Java include port works, railroads and water-power. By J. W. Evans, N. Y. C. 1600 words. Engineering News-Record, Sept. 11, New York.

Land Platting in Michigan. Abstract of paper at meeting of the Michigan Engineering Society, giving concise statement of general requirements for recording plats according to Michigan laws, with standpoint of owner, engineer and officials who handle assessments. By H. L. Brightman .Engineering and Contracting, Sept. 3, Chicago.

Canada Must Develop Her Great Fuel Resources. Dependence upon supply from United States is national menace despite best intentions of that country; international problem for engineers and statesmen. By A. V. White, cons. engr., Commission of Conservation of Canada, in address before Canadian Gas Ass'n. 4000 words. Canadian Engineer, Oct. 2, Toronto, Ont.

Overworking City Engineers. Editorial reference to action of Mayor of Seattle in recommending hiring a special engineer for Skagit power plant; city engineer a "general practitioner." 250 words. Municipal Journal and Public Works, Sept. 13, New York.

An Endowment Fund for "Boston Tech." A promise of $4,000.000 provided another $4,000,000 can be raised; editorial on the need of an endowment fund. 500 words. Municipal Journal and Public Works, Sept. 27, New York.

Analysis of High Cost of Living Problem. Report to Secretary of War Baker by Director of National Defence and summarized for information of Congress. By G. B. Clarkson, Washington, D.C. 1 chart, 5500 words. Gas Age, Sept. 15, New York.

Organization of a Laboratory for Industrial Research. Aims of a research organization; divisions of the laboratory. Abstract of paper before American Society of Mechanical Engrs., by A. D. Little and H. E. Howe. 2600 words. Engineering and Contracting, Sept. 24, Chicago.

School Building Program. Editorial reference to questions given out by Bureau of Education, Department of Interior, which must be answered before city can prepare school building program, properly planned. 200 words. Municipal Journal, Sept. 20, New York.

Erroneous Economic Articles in the Daily Press and How to Reduce Their Number. By H. P. Gillette, editor. 1500 words. Engineering and Contracting, Sept. 24, Chicago.

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## LET 1920 ROAD CONTRACTS NOW

As explained elsewhere in this issue, the amount of money available for construction of hard-surface roads next year will be unlimited. The limiting conditions will be the amounts of labor and materials available, including the ability to get the materials onto the ground.

From the middle of February to the middle of April, this year, more than 250,000 open-top cars, such as are used for hauling road materials, were standing idle, and this has been a more or less common experience in the past. If only these cars could be used next spring for hauling road material, preparatory to the year's construction, the total amount of highway improvement that can be performed would be greatly increased.

As for labor, while there is not so much urgency in advance preparation, still, contractors require some time to organize their forces and especially to secure the necessary experienced foremen, and the sooner they can be certain of the amount of next year's work, the better their chances of perfecting an adequate organization.

This means that by the middle of February contractors should be able to place their orders for materials and make their preparations for the season's work. This, in turn, involves the letting of contracts during December or January.

The city, county or state which delays later than February to let contracts for next season's road work is likely to find itself unable to complete, next year, anything like the amount of work that it may desire. Preparing plans and specifications, making estimates, advertising for bids and awarding contracts each requires some time, and the few weeks between now and February is none too long a time for properly completing these preliminaries to construction.

Plans for 1920 road work should be begun at once and put through without interruption.

## WATER WASTE PREVENTION SHOULD BE CONTINUOUS.

The elimination of waste of water, like liberty, can be maintained only by eternal vigilance. An occasional campaign for discovering leaks and discouraging waste may be effective for the time being, but the effect quickly vanishes. Pipes that have continued sound for years suddenly break for no ascertainable reason, old joints begin leaking, and the natural deterioration of house plumbing and the other appurtenances of a distribution system, aided generally by carelessness or ignorance of consumers, insures continual recurrence of leaks in various parts of the system. This being the case, the only preventive of waste is a continuous, organized survey of the entire system to insure that new leaks shall be discovered and stopped in a minimum of time.

There are few systems therefore, in which it cannot be demonstrated that one of the most important duties of the superintendent is continuous vigilance to keep leakage and waste at a minimum. In stopping waste he not only saves a considerable amount of water (this may at present be so abundant that saving it offers no inducement), but he postpones the time when it will be necessary to increase the size of mains, reservoirs and other features of the plant, and he immediately increases the pressure and the amount available for fires, which additional fire protection is a valuable and continuing benefit to the community.

In this issue will be found an interesting description of the experience of Washington, D. C., in continuous water waste elimination during a period of thirteen years—a service performed by a regular organization which has saved its cost many times over in the amount of waste and leakage which it has discovered and stopped.

# WATER WASTE PREVENTION SURVEYS IN WASHINGTON.

## Have Saved a Waste of Forty-five Million Gallons Daily—Description of Plan and Organization by Which This Has Been Effected During Thirteen Years of Continuous Investigation.

By PAUL LANHAM, Engineer in Charge of Division of Water Survey.

A few months ago, as part of a series of articles on "Water Works Operation," we published descriptions of methods for preventing waste of water, giving prominent place to the making of systematic surveys of the distribution system by districts. Washington, D. C., was among the first cities to make a complete and thorough survey of this kind and establish a permanent organization for continuing the work, and its experience and records along this line are not, we believe, surpassed or even equaled by those of any other city. During the past 13 years it has located and stopped 45,000,000 gallons daily of waste. Paul Lanham, the engineer in charge of this work, described the method of operation and some of the results obtained in a paper before the recent convention of the New England Water Works Association. This paper is given below.

Systems of water waste prevention surveys as applied in the various cities and by the private companies engaged in that class of work are basically the same. That is, the old Deacon system of English origin, with its division of the distributing mains into districts and the more or less complete analysis of the total flow affords the foundation upon which have been constructed the somewhat elaborate and thorough detailed system of the present day.

Two branches of work naturally form the complete system. First must be determined the necessity for the surveys, as indicated by the total consumption and per capita data for the whole plant, which must then be divided and separate determination made as to which sections or districts of the city are in condition demanding attention. After this of course follow the detailed surveys within these sections, by which the actual location and causes of the abnormal or wasteful conditions are determined.

### DISTRICT SURVEYS.

The first and probably most important step in starting a water survey of a city distribution system is the proper division of the mains into permanent districts. This necessitates a thorough study of the general layout and some knowledge of the direction and rates of flow in the different trunk mains. These latter facts can be easily determined by using portable pitot tube apparatus at various points. In selecting boundaries for the various permanent districts, it must be borne in mind that measureable velocities are necessary at the proposed district measuring points, that valve closures must be made at neutral or nearly neutral flow-points to avoid serious interference with pressure and supply, that subsequent work makes the segregation of like consumers in the same district not only desirable but almost necessary, that ample capacity must be provided in mains feeding the district when other mains are closed off during the measuring periods, and that the districts must be of such size as to permit a complete detailed survey within a period of one or two months to avoid confusion of data due to changes of season while the work is in progress.

These conditions cannot of course be secured fully in all cases. High and low service areas interfere, some sections have natural boundaries which must be followed regardless of the dictates of the system, and intermixtures of factories with residences in many cases produce undesirable conditions. Permanent boundaries, however, must be established as near as possible in conformation with the plan, and must thereafter be maintained permanent to avoid rendering useless for comparative purposes data previously secured.

Measurement of district flow should be made at as frequent intervals as possible. It would be ideal to maintain permanent recording instruments at the measuring points and keep constant record of the flow condition. This is impractical because of the extra fire hazard and other risks involved in maintaining a great number of closed valves throughout the system. From four to six measurements of at least seven days duration should be made, if possible, of the flow into each district each year. Portable recording pitot appartus, which MUST be used upon the detailed flow alaysis within each district, is ideally adapted to these measurements and its use for both purposes simplifies the equipment considerably. These measurements give mean daily consumption, and maximum, minimum and night rates of flow. Population count made by the inspectors while making the detailed surveys within the districts permits the district per capita rates to be determined. The per capita rate and the ratio of the night rate to the mean daily rate of flow are excellent indices of the condition of the district. Of course, consideration must be given to the character of the consumption when reaching conclusions based upon these figures. To facilitate this, a census of buildings also is taken during the progress of the detailed surveys and this together with all other data must be recorded permanently for future reference.

Very interesting facts are frequently brought out by study of the flow charts taken upon the various districts, and their value is limited only by the intelligence of the investigator. Cases on record show districts where the

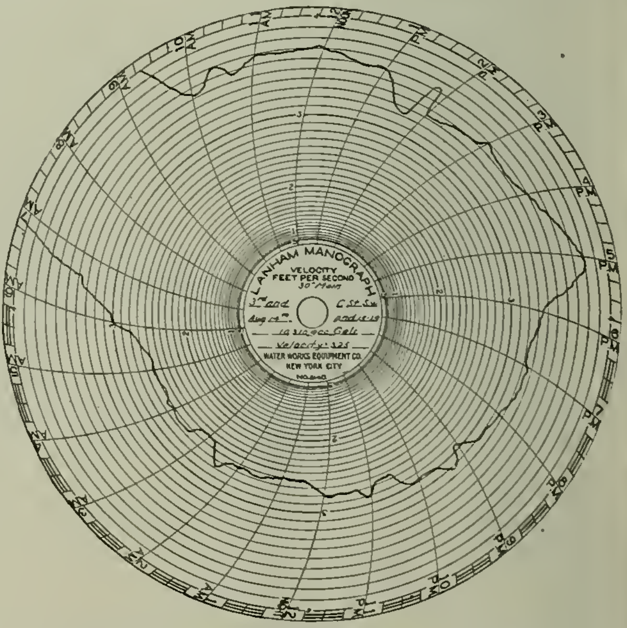


Fig. 1—TYPICAL MANOGRAPH CHART, SHOWING FLOW THROUGH 30-INCH MAIN SUPPLYING A PURELY RESIDENTIAL SECTION.

Note that night rate is about 80% of mean daily rate.

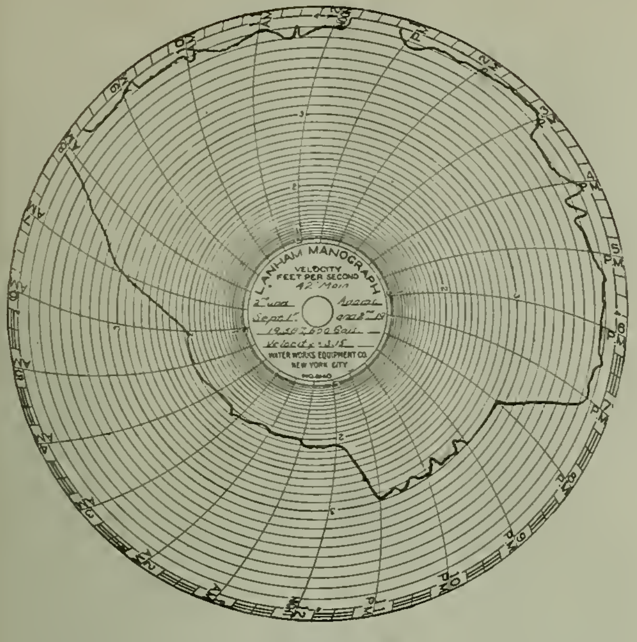


Fig. 2—FLOW CHART, SHOWING RATE THROUGH 42-INCH MAIN.

Note unusual peak during noon hour; also morning peak and rapid decline after supper and after 11 o'clock at night.

A comparison of conditions immediately before and after a detailed survey is particularly interesting and valuable, and the dates of measurements may advantageously be selected to permit this. The illustration No. 3 shows an index card taken from the files of Washington, D. C. At the top of this card is given the total and per capita consumption. The high percentage of night rate and extremely high per capita consumption both show the necessity for waste investigation. The other figures on the card show the result of the detailed investigation. All flows detected on the night analysis are classified and recorded as shown on the lower part of the card. A second survey was made April 19th to 25th, 1912, about 19 months after the first, in which the following figures were obtained:

Mean daily supply, 6,149,800 gals.; minimum night rate, 4,156,800 gals.; ratio of latter to former, 68%; per capita consumption, 282 gals. Subdivision survey started 8-7-11; finished 4-28-12; cost, $3,280.26. Resident population metered, 4,783; unmetered, 17,089. Floating population metered, 7,689; unmetered, 7,625; total population metered, 12,471; unmetered, 24,704; total, 37,176.

Number of dwellings metered and unmetered, 361 and 3,659 respectively; hotels and apartments, 50 and 17; restaurants, 40 and 6; factories, 14 and 18; municipal buildings, 9 and 8; federal buildings, 4 and 10; miscellaneous, 196 and 558; total buildings, 673 and 4,272.

Total night flow detected by subdivision tests, 2,072,700 gals. per day; of which 388,700 was inside metered premises, 564,600 was inside unmetered premises, 397,500 was due to underground leakage from services, 59,600 from mains, 800 unclassified—a total of 457,900 underground leakage. Municipal consumption was 52,000, federal consumption, 490,500; giving total flow accounted for of 1,953,700 gals. and leaving 119,000 unaccounted for.

In a number of cities, different water service areas supplied directly by individual pumps or by trunk lines, where venturi meters have been installed, constitute natural per-

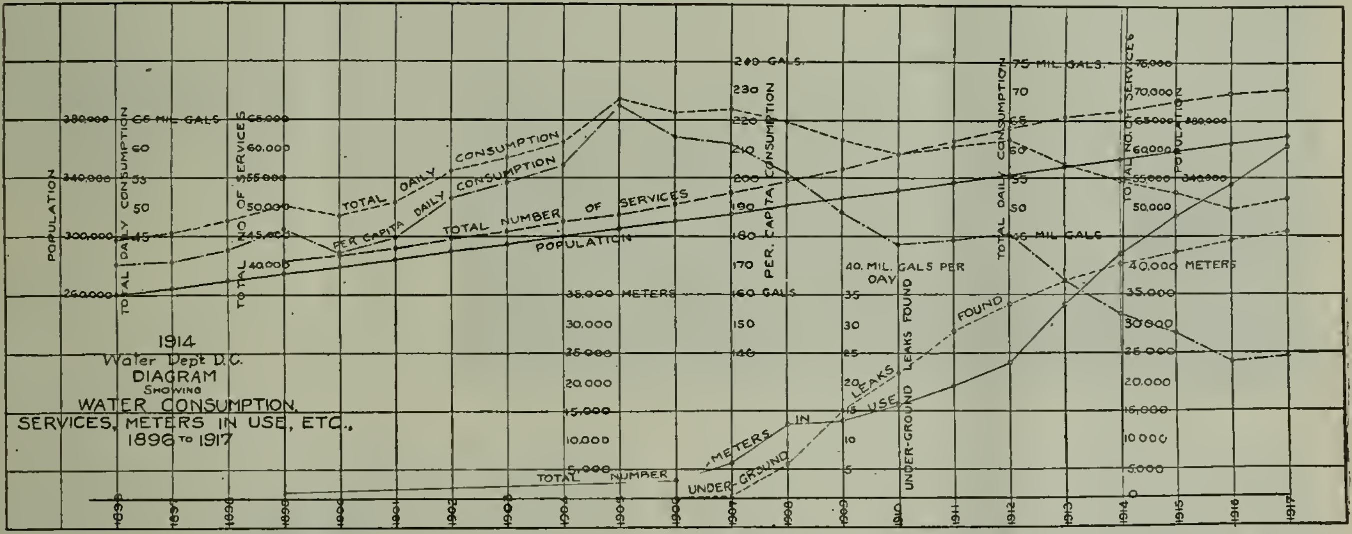
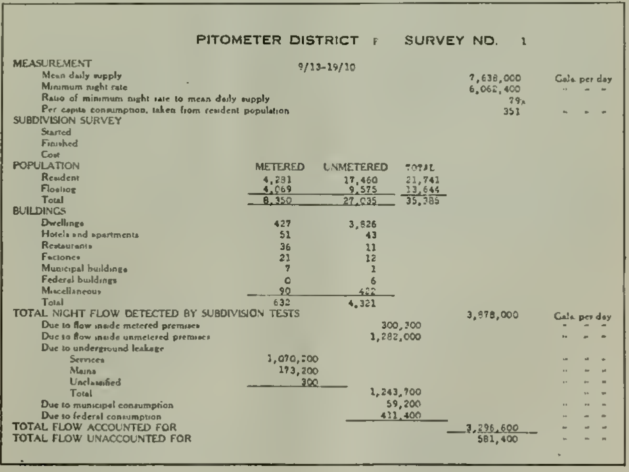


Fig. 4—GRAPHIC CHART, SHOWING METHOD OF RECORDING IMPORTANT DATA BEARING UPON CONDITION OF CITY DISTRIBUTION SYSTEM.

night rate of flow exceeds the rate during the daytime; others show a ratio of night rate to mean daily rate varying from zero to 100 per cent. Charts frequently show abnormally abrupt changes in the flow rate, excessive peak loads indicating over-taxation of certain mains, and many other facts have definite causes and reveal, upon study, all the secrets of the distribution system. Extreme variation in conditions will occur due to variation in usage in industrial plants, seasonal changes and other causes, so that the data obtained must if possible be compared with previous data obtained under like conditions to determine its full import. The illustration No. 1 shows a typical flow chart taken on a 30 inch main supplying a permanent district of almost purely residential nature. Note that the night rate is almost 80 per cent of the mean daily rate.

The illustration No. 2 shows a flow chart from a 42-inch main supplying a large area. Note the usual morning peak load, occurring in this case at 8:00 o'clock. Note also the peak during the noon hour, which is a rather unusual. Rapid decline in rate of flow after 7:00 P. M. and again after 11:00 P. M., give insight into the habits of the



PITOMETER DISTRICT F SURVEY NO. 1

| | | | | | |
|---|---|---|---|---|---|
| MEASUREMENT | | 9/13-19/10 | | | |
| Mean daily supply | | | | 7,638,000 | Gals. per day |
| Minimum night rate | | | | 6,062,400 | " " " |
| Ratio of minimum night rate to mean daily supply | | | | 79% | |
| Per capita consumption, taken from resident population | | | | 351 | " " " |
| SUBDIVISION SURVEY | | | | | |
| Started | | | | | |
| Finished | | | | | |
| Cost | | | | | |
| POPULATION | METERED | UNMETERED | TOTAL | | |
| Resident | 4,281 | 17,460 | 21,741 | | |
| Floating | 4,069 | 9,575 | 13,644 | | |
| Total | 8,350 | 27,035 | 35,385 | | |
| BUILDINGS | | | | | |
| Dwellings | 427 | 3,826 | | | |
| Hotels and apartments | 51 | 43 | | | |
| Restaurants | 36 | 11 | | | |
| Factories | 21 | 12 | | | |
| Municipal buildings | 7 | 1 | | | |
| Federal buildings | 0 | 6 | | | |
| Miscellaneous | 90 | 422 | | | |
| Total | 632 | 4,321 | | | |
| TOTAL NIGHT FLOW DETECTED BY SUBDIVISION TESTS | | | | 3,878,000 | Gals. per day |
| Due to flow inside metered premises | | | 300,300 | | " " " |
| Due to flow inside unmetered premises | | | 1,282,000 | | " " " |
| Due to underground leakage | | | | | |
| Services | 1,070,200 | | | | " " " |
| Mains | 173,200 | | | | " " " |
| Unclassified | 300 | | | | " " " |
| Total | | | 1,243,700 | | " " |
| Due to municipal consumption | | | 59,200 | | " " " |
| Due to federal consumption | | | 411,400 | | " " " |
| TOTAL FLOW ACCOUNTED FOR | | | | 3,296,600 | " " " |
| TOTAL FLOW UNACCOUNTED FOR | | | | 581,400 | " " " |

Fig. 3—INDEX CARD SHOWING METHOD OF FILING DATA.

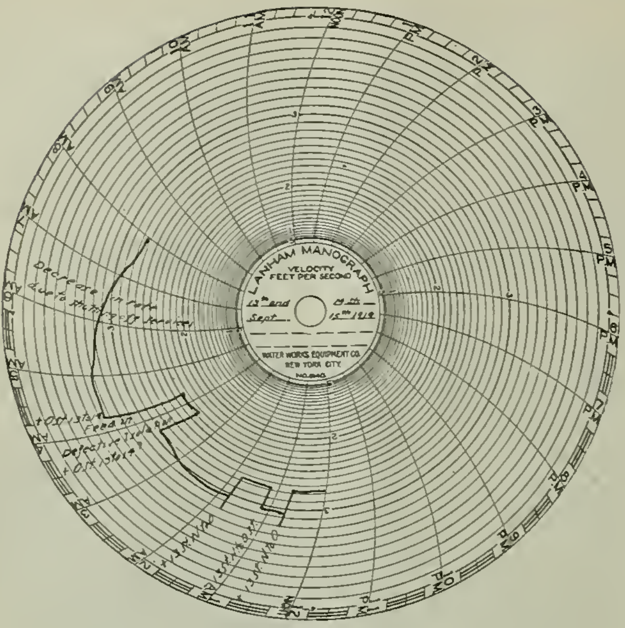


Fig. 5—NIGHT SUBDIVISION TEST CHART.
Showing effect of cutting off different squares for test.

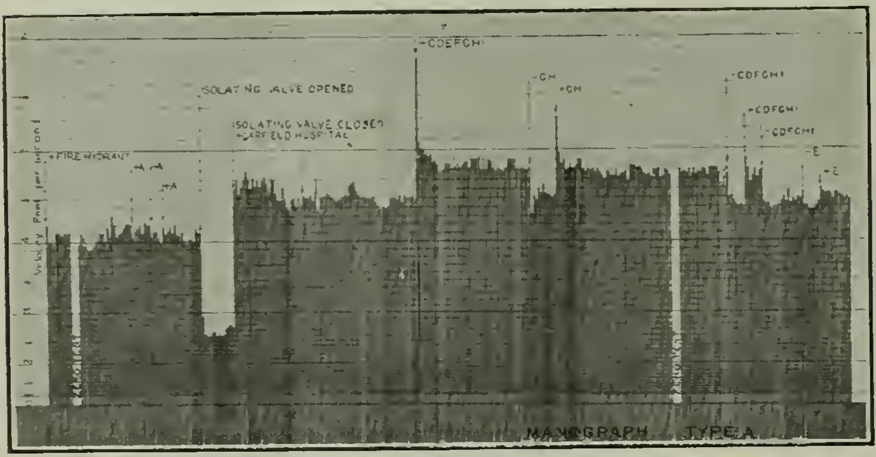


Fig. 6—NIGHT SUBDIVISION TEST CHART TAKEN ON A TYPE A MANOGRAPH.

manent districts which can be observed at all times by inspection of either the pumping records or the venturi charts. In many cases these natural districts are too large to be properly treated as permanent survey districts but they form convenient units for checking total figures obtained by consolidating the data secured concerning the permanent districts within their limits.

Such data as mean daily consumption, per capita consumption and night rate of flow for the entire city should be plotted constantly as a matter of general interest and value. These figures are usually obtainable from pumping station or filtration plant reports. They form the measure of the effectiveness of the surveys and are indisputable. The graphic chart, illustration No. 4, is the best method of recording these data, as improvement or decline in condition is instantly observed without recourse to figures.

### DETAILED SURVEYS.

Detailed surveys within the permanent districts, made for the purpose of ACTUALLY locating and weeding out the wastes and leaks from the legitimate consumption, follow a well defined basic system also, but the degree of thoroughness and success depends greatly upon the limitations of the pipe system in the matter of valves and stopcocks, and the ability of the operators. Measuring points having been established throughout the permanent district under survey, the portable recording pitot apparatus is moved from place to place as the work progresses and each section of main is given close examination.

Small temporary test districts are isolated after eleven o'clock at night and the total rate of flow into them observed and recorded on the pitot chart. Work of testing and inspecting is continued through the night until about four o'clock A. M., when it is found that the rate of flow becomes unsteady and interferes with the tests. Tests are made at this time because legitimate consumption is then at a minimum, while leaks and wastes will still be running at full head. In residential sections the rate during these hours is practically 100 per cent illegitimate.

The method of test consists simply of measuring the rate of flow into a limited number of squares and noting either the increase or decrease in this rate caused by altering the number of squares included in the test district. By "square" is meant a section of the main in a given street lying betwen adjacent intersecting streets. In most cities valves are placed at these points. Of course, the location of valves really determines the extent of the main included in each separate test. To go into detail, assuming a rate of flow of 100,000 gallons per day, for instance, in a test district of two squares, the rate of flow increasing to 110,000 gallons upon the addition of another square indicates of course that the rate of flow into this additional square is 10,000 gallons daily. Reversing the process, the rate would of course drop from 110,000 gallons to 100,000 gallons if the square is excluded from the test district. Both methods of testing are utilized as conditions require. The method of adding squares is preferable, as it keeps the size of the district under test always at a minimum, thereby facilitating the work by frequently excluding for longer periods undesireable fluctuations in certain squares, also by immediately locating this fluctuation upon its appearance upon the chart coincident with the addition of a square under test, permitting the immediate exclusion of this square to avoid its interference with other tests.

The illustration No. 5, shows a typical chart taken upon a subdivision night test. Note the changes in flow rate occurring coincident with the valve operation. Also note the high momentary rate coinciding with each valve opening due to rapid flow into

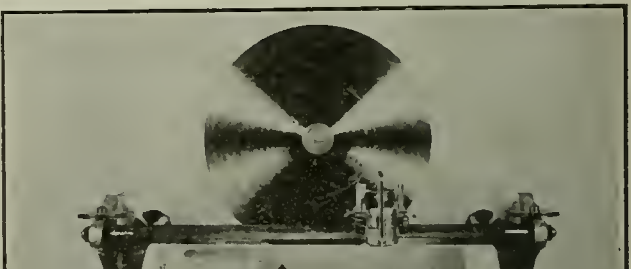


Fig. 7—TYPE A MANOGRAPH.
Special type of pitot recorder used for subdivision tests.

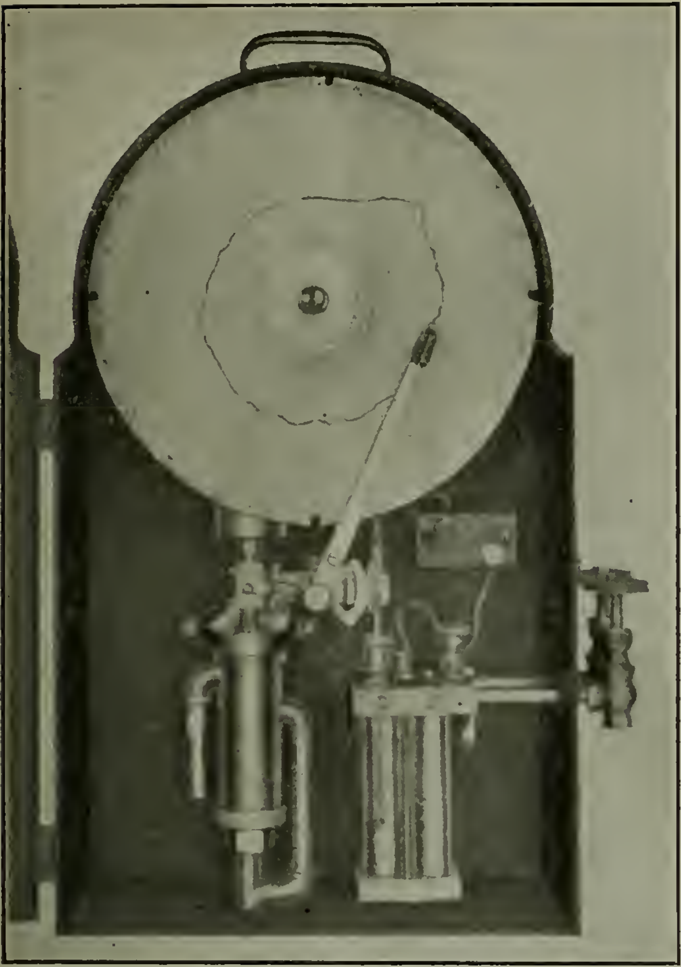


Fig. 8—TYPE B C MANOGRAPH.
Used for all classes of pitot work.

shut off preceeding the test and verifies the existence of a leak or waste in the square.

The illustration No. 6, shows another chart of subdivision night test in residential territory. Note the fluctuation occurring in the rate of flow. Repetition of test and careful observations are necessary to detect small changes in the flow rate. Note how rate of flow dropped when isolation was opened preparatory to extending it to include Garfield Hospital. The usual method in preparing for the addition of a square is to close the valve at the far end first, which cuts off the only remaining feed, test the shut-off by opening fire hydrant or other fixture, and then open the valve at the near end of the square. In cases where the water cannot be cut off, as in the case of Garfield hospital, the near valve is opened first, temporarily destroying the isolation, permitting water to flow into the test district through this opening until the valve at the remote end of the square is closed.

The recording apparatus for this testing work should produce a chart visible at all times, have a rapid chart movement, and be quickly responsive to the smallest changes in rate of flow.

Fig. 7, shows a type of Pitot recorder used for many years in Washington, D. C. It is known as the Manograph Type A and meets the prescribed conditions. Fig. 8, shows a latter type of instrument used in Washington and many other cities in waste-prevention work. It is known as the Manograph Type B. C. It differs from the first illustration only in the character of the chart.

The illustration No. 9, shows method of setting up pitot tube and recorder ready for measuring total flow or making tests. The use of indicators without the chart is not satisfactory, due to the fluctuating rate of flow always occurring, even in residential sections, in the small hours of the morning. The reasons for these fluctuations constitute somewhat of a mystery and they interfere seriously with testing where small flows are involved.

The locating of the night flow first involves the use of all street valves, and when the flow has been definitely determined as to quantity and location within the closest limits permissible with these valves, recourse is had to the aquaphone or water-phone and the operators listen with it on each curb stop-cock, fire hydrant, lawn sprinkler connection, or any other fixtures attached to the main within the pre-determined limits. Examinations are made also of all sewer manholes, large sewers, electric or other ducts, and advantage is taken of every facility to determine the exact location of the flow. Flows due to fixtures or other causes within the houses or buildings are readily determined when the aquaphones are placed against the curb stop-cocks and the operators hear the flow passing through the pipe. If closure of the stop-cock causes stoppage of the sound, this proves that the leak or flow is in the particular service pipe under observation or in the building supplied by it, and the amount is registered by the pitot recorder, being the reduction in rate of flow coincident with the closure of the stop-cock. Flows due to leaks on the mains or on service pipes between the main and curb stops can be heard on the service pipes, but these flows will not be affected by closure of the stop-cocks, nor will any reduction of rate of flow occur at the recorder. The total quantity of flow due to these unaccounted for or so-called "outside" flows may readily be determined by a second test of the entire square with all inside flows shut off at the curb line.

It is frequently necessary to drive test holes down to the mains and service pipes to permit the use of the aquaphone in definitely locating an underground leak within closer limits than provided by the valves, stop-cocks or other fixtures, increasing loudness at the different points indicating that the operator is nearing the leak. Frequently water or mud will be observed on the end of the steel prod used for this purpose and this indication is utilized. Proper use of the aquaphone is really a science and long experience is necessary for one to become expert in its application to the underground leakage problems. The illustration No. 10, shows a field party engaged in prodding for underground leaks, existence of which has been detected by a night subdivision test. The laborer is engaged in driving heavy steel pin through sheet asphalt preparatory to using steel prod and aquaphone. During the progress of the night tests the operator in charge makes notes as to each step in the procedings and has an instrument tender place an identification mark upon the chart at each point corresponding with the test, signals by lanterns or otherwise being utilized; this greatly facilitates interpretation of the

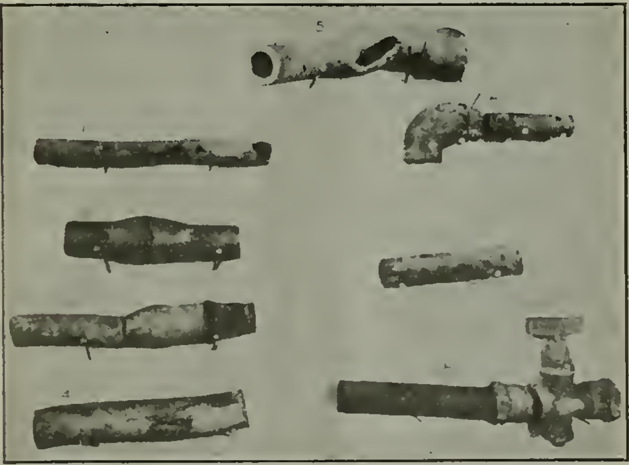


Fig. 10—EXAMPLES OF LEAKING SERVICE PIPES.

1. Corroded black iron pipe, about twenty-five years old.
2 & 3. Defective wiped joint due to poor workmanship, a frequent cause of waste.
4 & 5. Lead pipes damaged by freezing.
6. Broken iron pipe. Breaks are more frequently found at elbows and tees than elsewhere.
7. Corroded iron pipe.
8. Defective stop-cock caused by abuse in placing key in operating. Cocks should be of heavy pattern to withstand rough treatment caused by difficulty in placing keys.

Fig. 9—FIELD PARTY OF WATER SURVEY DIVISION PREPARING TO PROD FOR LEAK NOT SHOWING ON SURFACE.

charts, and this system is superior to the time schedule system of testing, in which the time of test is noted to be located on the chart later.

It is apparent from the description given that the basic system is very simple and that by exercises of care and good judgment results should be secured by anyone. The difficulties met with in practice are frequently very discouraging, however, and the getting of results in spite of them taxes the ingenuity of the operators. These difficulties consist of inaccurate maps which fail to show important mains, cross connections, valves and other features vital to the proper isolation of the district and individual squares; inaccessible curb stop-cocks which must be cleaned out at the expense of much labor, broken valves and stop-cocks, leaking valves, obstructed mains, unrecorded cross-connecting service pipes, and fluctuating rates of flow, causing confusion and wrong deductions.

The illustration No. 11, shows samples of underground breaks found only a few feet below the surface, their presence having been unsuspected until revealed by the tests. Fig. 12, shows in a most convincing manner the aggregate effect of this work in large sections. Note the heavy decrease in consumption coincident with the surveys as compared to invariable increases at other periods.

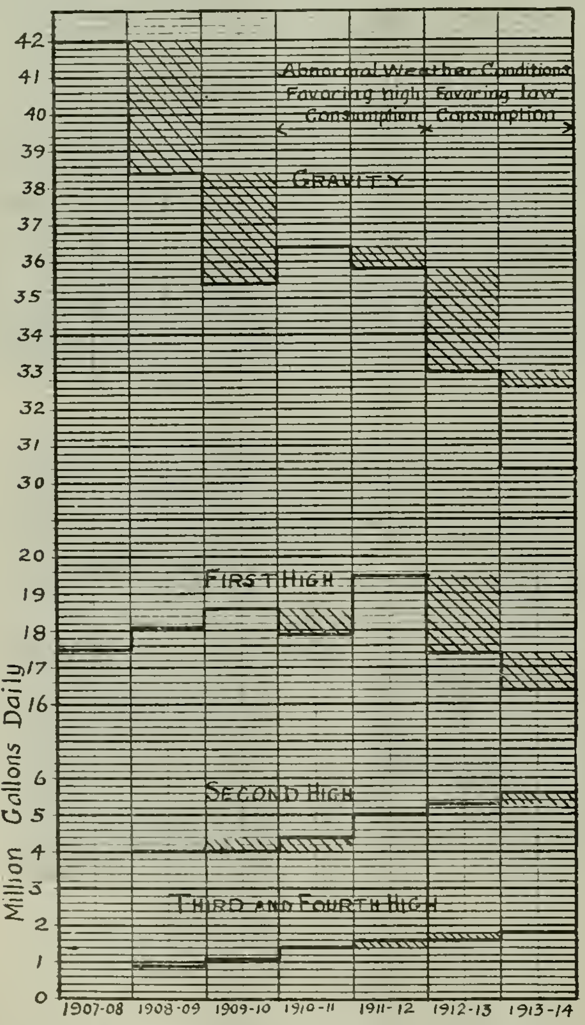


Fig. 11—CHART SHOWING EFFECT OF SURVEY ON DIFFERENT WATER SURVEY AREAS.

Lined sections show range of surveys. Note invariable decrease in consumption following surveys, compared to increasing rates at all other times.

ORGANIZATION OF FORCE.

The organization of a properly balanced force to efficiently handle the water waste problem is a matter depending considerably upon local condition. In general, the force should be supervised by an experienced engineer, with at least one clerk and one draftsman comprising the over-head organization, and as many field parties as the circumstances demand. Each field party should consist of a chief operator and two or more inspectors, with necessary laboring force to clean out stop-cock boxes, open necessary excavations, operate valves and perform other necessary miscellaneous duties. At least one laborer is required for each inspector and of course more will be required if many leaks are found. The following is the working organization which has saved over 45,000,000 gallons daily underground leakage in the past 13 years. This division is coordinate with the enginering, revenue and other major divisions of the Water Department of Washington, D. C. One enginer in charge, with a total of thirty-one employes. An assistant in charge of the field work, and under him four field parties for making house inspections and repairs to cut-off boxes, three of which contain a field operator, 2 inspectors and 3 laborers each, and the fourth an assistant field operator, one inspector and 3 laborers; also a draftsman. "Computations and office records" are in charge of an inspector, with the card records and files attended to by a skilled laborer, and the blue-printing and clerical work by another. "Extension of plant" is attended to by a machinist and a skilled laborer.

Waste prevention surveys have been made in numerous cities along the lines described and the results have been most gratifying. In one city over 2,000,000 gallons daily was the result of only one year's work by a single field party. Reference to official records of Washington, D. C. Baltimore, Md., Utica, New York City, and West Point, N. Y., Newark, Perth Amboy and Kearney, N. J., and many other places, reveals data proving the value of this work beyond all question.

## BIDDING ON PUBLIC WORK

### When Officials Can and Can Not Exercise Discretion —Must Observe Provisions Under Which Bids Were Invited—Rejecting All Bids.

By J. J. SIMPSON.

Where contracts are required to be let to "the lowest bidder," without qualification, the duty of awarding must be performed without the exercise of any judgment or discretion and the contract must be awarded to the bidder who is actually lowest. In such a case the duty of the board is ministerial and not judicial. It is a mere matter of computation. The law says the board may contract with the lowest bidder; not with the bidder whose bid, in their judgment, is the most advantageous to the city, but with the person who will bid to do the work for the least money. The situation here is entirely unlike those cases where the authority conferred is to let the contract to the lowest bidder "giving adequate security," or to the "lowest responsible bidder." Here the sole test is price. People v. Scannell, 40 Misc. (N.Y.) 297, 82 N. Y. Supp. 362; Appleby v. New York, 15 How. Pr. 428; Holden v. Alton, 79 Ill. 318, 53 N. E. 556; Mueller v. Eau Claire County, 108 Wis. 304, 84 N. W. 430.

Where the contract can be let to "the lowest responsible bidder" or "the lowest and best bidder," or some other similar qualifying word or phrase is employed, the general rule is that the municipality has a discretion in determining which is the lowest and best bidder, and its decision will not be interfered with by the courts, provided it acts in good faith, in the public interest, without corruption, collusion or fraud, or from motives

of personal prejudice. State v. Herman, 63 Ohio St. 440, 59 N. E. 104; People v. Gleason, 121 N. Y. 631, 25 N. E. 4; Interstate Vitrified Brick, etc. Co. v. Philadelphia, 164 Pa. St. 477, So Atl. 383; Johnson v. Chicago Sanitary Dist. 163 Ill. 285, 45 N. E. 213; Kendinger v. Saginaw, 132 Mich. 395, 93 N. W. 914; Denver v. Dumars, 33 Colo 94, 80 Pac. 114.

But the authorities must in all cases exercise a real discretion based upon facts, and are not entitled to act arbitrarily. People v. Buffalo, 84 N. Y. Supp. 434; Fourney v. Franklin, La. 151, 52 So. 249; Clapton v. Taylor, 49 Mo. App. 117; Baltimore v. Keyser, 72 Md. 106, 19 Atl. 706. Even in good faith they may not arbitrarily prefer one bid over another, or negotiate privately with an individual bidder. Chippewa Bridge Co. v. Durand, 122 Wis. 85, 99 N. W. 603; and an arbitrary award may be prevented from being made if action is brought in time. Molloy v. New Rochelle, 123 N. Y. App. Div. 642, 108 N. Y. Supp. 120.

Frequently the right to reject any or all bids is reserved by statute or by the advertisement. In such a case the municipality has the power to reject any and all bids, and may consider the financial ability, business judgment and capacity, the skill, responsibility and reputation of the various bidders, and the quality of materials submitted. Inquiry, investigation, comparison, deliberation, and decision are necessarily involved. United States Wood Preserving Co. v. Lundmaker, 186 Fed. 678, and cases therein cited. In the exercise of a sound descretion the contract may be awarded to another than the lowest bidder. Kelly v. Chicago, 63 Ill. 279; Peckham v. Watsonville, 138 Cal. 242, 71 Pac. 169; Kelly v. Baltimore, 53 Md. 134; Brown v. Houston (Tex.) 48 S. W. 760. But there is no binding obligation to award it to any bidder, and all bids may be rejected and the improvement abandoned, if this is done in good faith. Grant v. Detroit, 91 Mich. 274, 51 N. W. 997. Or the authorities may reject all bids and readvertise. Palmer v. Haverhill, 98 Mass. 487; State v. New Orleans, 48 La. Ann. 643, 19 So. 690; Keogh v. Wilmington, 4 Del. Ch. 491. It has even been held that any bid may be rejected on a technicality. Talbot Paving Co. v. Detroit, 109 Mich. 657, 67 N. W. 979. Or all bids may be rejected, even if done arbitrarily and unwisely. State v. Cincinnati, 3 Ohio C. C. 542.

It is a well settled general rule that public authorities cannot make or permit any material changes in any of the terms of the proposed contract after the bids are in.

All persons desiring to bid upon the work willing to comply with the terms prescribed, should have equal opportunities to do so. If the work is not awarded upon the first competition for any particular reason, it should be submitted to a second, with full opportunity, as before, for all desiring to participate to do so. Chippewa Bridge Co. v. Durand, 122 Wis. 85. See also Touchheim v. Philadelphia, 218 Pa. 100.

The award of a contract containing provisions beneficial to the contractor, not contemplated by the forms of bid supplied to bidders, and which were substantially similar to the conditions incorporated in the bid of the contractor to whom the contract was awarded, was held invalid, although such conditions were stricken out before the acceptance of the bid. Otherwise the successful bidder would have had the advantage of two bids. Wickwire v. City of Elkhart, 144 Ind. 335. 43 N. E. 218. In this case the court said: "To require the bids upon one basis and award the contract upon another would, in practical effect, be an abandonment of all bids." To the same effect are People v. Board of Improvement, 43 N. Y. 229; Shaw v. Trenton, 19 N. J. L. 339. In Inge v. Board of Public Works of Mobile, 135 Ala. 200, 33 So. 678, the Alabama Supreme Court said that any material departure in the contract awarded from the terms and conditions upon which the bidding is had, renders the contract, in a sense, a private one. To permit such in the awarding of public contracts by public officers would be to open wide the door for favoritism and defeat the thing which the law intended to safeguard in requiring the contracts to be let upon bids made on advertised specifications. It is unimportant whether the additional stipulation contained in the contract awarded to one who is not the lowest responsible bidder be in itself an advantage to the city or not, if it constitutes a material change and therefore a departure from the basis of the bidding, and becomes an element or consideration in the determination of who is the lowest and *best* bidder, it will invalidate the con tract entered into.

Where, in response to an advertisement for proposals to do certain work, upon certain conditions, a bid has been made and accepted, but the formal contract, contemplated by both parties, has not yet been drawn, the rights of the parties are so far fixed that the essential conditions of the proposal cannot be varied by either. So a condition which a board has statutory authority to make cannot be imposed upon a contractor whose bid has been accepted, unless it was contained in the advertisement. Campbell v. City of Philadelphia, 15 Phil. 141.

Private negotiations between municipal authorities and a successful bidder, through which the terms and conditions of the competitive bids are so modified and changed that the successful bidder becomes in fact the lowest bidder, are not within the spirit of the Pennsylvania statute requiring contracts to be awarded to the lowest responsible bidder. Touchheim v. Philadelphia, 218 Pa. 100.

Proposals for a water supply were advertised for and received by the authorities, and one of the competitors was permitted by the engineer, to whom the proposals were referred for calculation and comparison, to alter his bid so as to make it appear lower than that of the others. After acceptance of this bid, a contract was made at higher prices, with a large number of prices stipulated for therein not in the competition at all, and with a material clause inserted to the benefit of the contractor, in no manner contemplated by or offered to the other bidders. It was held, Dickinson v. Poughkeepsie, 75 N. Y. 65, that the contract was unauthorized and void.

In Case v. Trenton, 76 N. J. L. 700, it was said; The municipal authorities should not be permitted to waive any subtantial variance between the conditions under which bids are invited and the proposals submitted. If one bidder is relieved from conforming to the conditions which impose some duty upon him, or lay the ground for holding him to a strict performance of his contract, that bidder is not contracting in fair competition with those bidders who propose to be bound by all the conditions. This is the policy which prevents the modification of specifications after bids have been presented, and the awarding of the contract to one of the bidders based upon such revised specifications.

Where a bid, filed within the time fixed by the advertisement for receiving bids, is substantially changed and modified after such time, it is to be regarded as a new bid, received after other competitors, by the terms of the notice,had a righ to presume that the contest was closed, and it could not be legally accepted. Fairbanks v. City of North Bend, 68 Neb. 560.

After accepting a bid, alterations cannot be made in the contract which materially change it from that submitted to competitive bidding. Moran v. Thompson, 20 Wash. 525. Addis v. Pittsburgh, 85 Pa. 379. Townsend v. Holt County, 40 Neb. 852. It has been held that this is so notwithstanding the fact that but one bid was presented for the work. Le Tourneau v. Hugo, 90 Minn. 420.

Under the rule above stated public authorities cannot extend the time for receiving bids. State v. York County, 13 Neb. 57. But it has been held that they might consider a bid accidentally delayed beyond the time limit, delivered before any others were opened and where there was no fraud. Kerr v. Central Board, 25 Pittsb. L. J. N. S. 54.

The time within which the contract is to be completed cannot be extended, Kaisch v. San Francisco, 80 Cal. 1, 22 Pac. 22; Chicago v. Mohr, 216 Ill. 320, 74 N. E. 1056; McQuiddy v. Brannock, 70 Mo. App. 535; nor can the time for payment of the contract price, Diamond v. Mankato, 89 Minn. 48, 93 N. W. 911.

If the first award should fail, or if the contractor thereunder abandon the work before completion, all bids may be rejected, and the work readvertised. People v. Fay, 3 Lans. (N. Y.) 398; Goss v. State Capitol Commission, 11 Wash. 474; Murphy v. Philadelphia, 25 Phil. Leg. Int. 333. Or, if no statute is thereby violated, and the rights of no third party have intervened, and in the absence of fraud, the contract may be awarded to the next lowest bidder. Kinsella v. Auburn, 54 Hun, (N. Y.) 634; Corry v. Corry Chain Co., 18 Pa. Super. Ct. 271; Turner v. Fremont, 159 Fed. 221 affirmed 170 Fed. 259; Gibson v. Owens, 115 Mo. 258; *In re* Leeds, 53 N. Y. 400; Leitz v. New Orleans, 136 La. 483; 67 So. 339; Sanitary Dist. v. McMahon, etc. Co., 110 Ill. App. 510.

Though the Michigan court has held, Twiss v. Port Huron, 63 Mich. 528, 30 N. W. 177, where the statute required the award to go to the lowest bidder, and the lowest bid was allowed to be withdrawn because of an alleged mistake, and the contract was then awarded to the next lowest bidder without readvertising, that this was without the rightful descretion of the authorities. And the California courts also hold that in such a case it is necessary to readvertise before awarding the contract to another. Meuser v. Ridson, 36 Cal. 239, Dougherty v. Foley, 32 Cal. 402.

## COURSE IN HIGHWAY ENGINEERING AND TRANSPORT.

The University of Michigan is offering a short-period graduate course in Highway Engineering and Highway Transport, which is intended to meet the needs of practicing engineers, contractors, and engineer-salesmen. A schedule extending from December 1st to March 19th has just been approved by the Board of Regents of the University.

Nine courses are included; these, with the fees for each, being as follows:

By Prof. Arthur H. Blanchard: Highway Transport, Feb. 2 to 6; $5. Bituminious Surfaces and Bituminous Pavements, Dec. 1 to 19; $15. Cement Concrete Pavements, March 1 to 9; $5. Brick Pavements, March 11 to 19, $5. Highway Engineering Seminar, Dec. 1 to March 19; $15.

By Prof. John H. Bateman: Highway Laboratory Research, Jan. 5 to 23; $10 to $15 (depending upon student's previous training in highway laboratory methods). Earth, Gravel and Broken Stone Roads, March 1 to 12; $10.

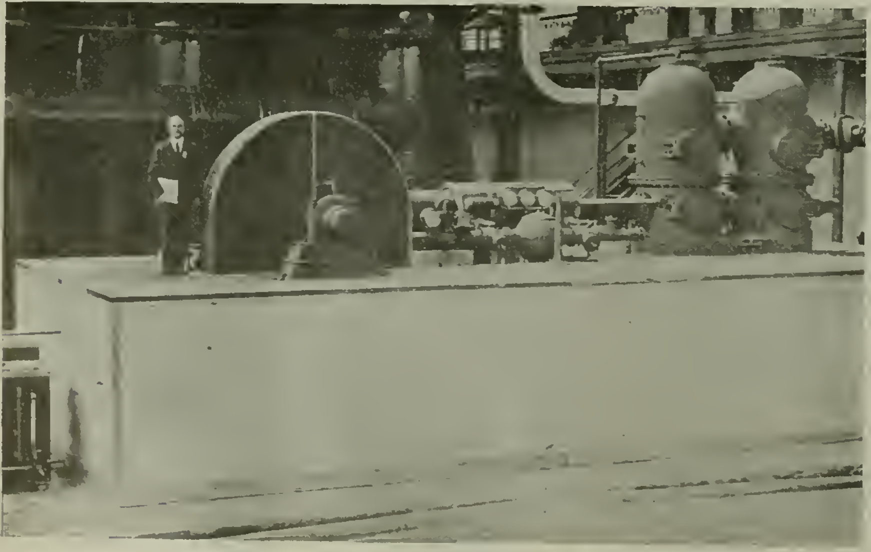
By Prof. Lewis M. Gram: Highway Bridges, Feb. 9 to 20; $10.

By Prof. Henry E. Riggs: Specifications and Contracts, Feb. 9 to 20; $10.

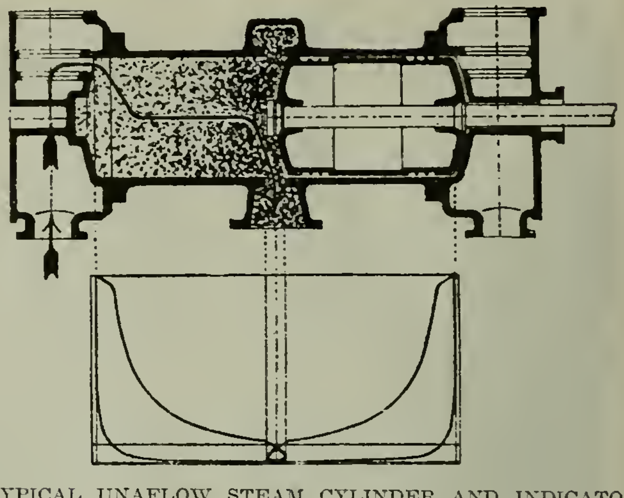
Further information may be obtained from Prof. Blanchard, who states that "the University of Michigan is at present the only institution offering work of this character."

## TESTS OF A UNAFLOW PUMPING ENGINE.

A type of steam engine known as the Unaflow has come into more or less prominence during the past year or two, and while the principle of it is not particularly new, successful efforts to develop it as a practical and efficient commercial machine are quite recent. A pump of this kind has been installed at the Porter Avenue pumping station of the Buffalo water works which has a capacity of about three million gallons in 24 hours. Tests have been made on this pump by the builders, and these tests are being continued, and it is possible may lead to slight modifications in design or operation of the pump. The principle of the pump and the results of the tests so far made formed the subject of a paper before the New England Water Works Association by A. Decrow of the Worthington Pump and Machinery Corporation, New York. The information therein given is abstracted below.



INSTALLATION IN THE PORTER AVE. PUMPING STATION OF THE BUFFALO WATERWORKS.



TYPICAL UNAFLOW STEAM CYLINDER AND INDICATOR CARD.

The pump derives its name from the fact that the steam entering the cylinder travels through it continuously in one direction. The heat energy of the steam is utilized in the cylinder during the period of its admission, expansion and flow, the expanded steam being exhausted through ports or openings uncovered by the travel of the cylinder piston when most remote from the point of admission. A typical cylinder is shown in the accompanying diagram.

In this, the piston is shown at one end of the stroke and the exhaust ports are uncovered. The arrow indicates the path of the steam through the cylinder. There is practically no change of temperature of the steam until the point of cut-off is reached. After this, expansion takes place with a constant drop in temperature, and at this time condensation begins due to the changing of heat into work. The cylinder head is jacketed with high steam, consequently no condensation takes place on the walls of the head, but condensation takes place on the wall of the piston, which is comparatively cool, so that at the end of the stroke the moisture of condensation is mostly at the exhaust end of the cylinder; and as the steam expanding from the cylinder head rushes out through the exhaust port, it takes the moisture with it. At this time there is a sudden drop in temperature in the cylinder due to the sudden drop of pressure, but as the inlet end of the cylinder is dry and the flow of heat from a dry surface is slow, there is no perceptible drop of temperature on these dry walls. On the return stroke the exhaust port is covered by the piston, trapping in the cylinder comparatively dry steam that has been partially superheated. As the walls of the cylinder have retained their heat, the heat of compression is not absorbed by either moisture or cold walls as in the case of the counter-flow engine, and the steam remaining in the clearance is heated by compression to a temperature above that of the initial steam. When the valve is opened to start the next stroke, the live steam rushes into the clearance space, and as the entrapped steam here is hotter than the entering steam, there is no initial condensation. Practically all of the moisture is removed at each stroke and therefore the heat losses caused by the pressure of water in counter-flow engines are avoided.

In addition, leakage losses at the exhaust valves, found in counter-flow engines, are eliminated. The absence of initial condensation permits a high economic ratio of expansion in one cylinder. There is therefore apparently no particular gain in economy in compounding this type of engine.

The engine in the Porter avenue station is of the horizontal type with one steam cylinder and one double-acting plunger pump. It was designed for a water pressure of 100 pounds, suction lift of 15 feet plus the friction in 60 feet of suction pipe, a steam pressure of 235 pounds and 100 degrees F. superheat. The engine is entirely encased so that no moving parts whatever are visible.

One of the problems in connection with adapting this engine to pumping was to develop a pump valve that would operate satisfactorily under all the varying conditions of speed and pressure to which pumping engines may be subjected. A valve has been designed which it is thought meets these requirements. In order to test it, it was placed in a power pump, driven by a variable speed motor and having a single-acting plunger; the valves being surrounded by glass cylinders so that their operation could be observed. This pump was run at speeds varying from 50 to 290 revolutions per minute. The maximum lift of the valve was three-tenths of an inch. The average velocity through the valves at the various speeds varied from 1.54 feet per second to 7.42 feet. The slip in no case exceeded four-tenths of one per cent, while at some speeds the slip was calculated to be negative—that is, the plunger displacement was less than the water pumped. The valve was noiseless in operation until, at 290 r. p. m., it tapped the valve guards.

It has not yet been possible to obtain all of the working conditions for which the Porter avenue pump was designed. For instance, instead of 100 degrees superheat, it is found that less than one-tenth of this is actually available. An independent superheater which was being installed at the time this paper was written would permit making tests with degrees of superheat varying from 10 to 200 degrees.

A test for steam consumption has been completed with approximately 200 pounds steam pressure, 95 pounds water pressure, 10 degrees superheat, 27.2 inches vacuum and 203 revolutions per minute, and the resulting steam consumption per indicated horse-power-hour was approximately 12.4 pounds, as compared with 11.9 pounds which the perfect unaflow engine with 27 inches vacuum is supposed to develop under these conditions. The resultant duty was something under 140 million foot-pounds..

A slip test with calibrated nozzles was made at speeds ranging from 100 to 202 r. p. m. and the percentage of slip was found to decrease at a uniform rate as the speed of the pump increased.

Both these tests were made hurriedly for the purpose of obtaining data to present with this paper, but many more tests are contemplated in order to obtain a more complete and accurate knowledge of the possibilities of the pump.

## UNLIMITED FUNDS FOR ROAD CONSTRUCTION

The total amount available for hard-surface highways in 1920 is $633,000,000, according to the computation of the Bureau of Public Roads of the U. S. Department of Agriculture. The amount spent this year will, it is estimated, total $138,000,000, which is the record so far; but is only about one-fifth the amount available for next year.

It is improbable, of course, that all of this can be spent, but its availability means that the expenditure will be limited only by the quantity of materials and labor available, the facilities for railway transportation, the inclinations of the several boards or other governmental agents having charge of the work, or other limitations not financial. For all practical purposes, therefore, the amount of money available is "unlimited."

Of this total, $165,000,000 is carried forward from unfinished 1919 contracts; $273,000,000 will be furnished by state and county taxes and Federal aid; $50,000,000 by one-fifth state and county bond issues not before available; $45,000,000 by one-third unexpended balance of state and county bond issues previously available; and $100,000,000 available from new bond issues to be voted on before next summer.

The limit set by the freight facilities can be extended if only road building interests will prepare now to utilize all spare railway cars between now and spring for hauling road materials, especially the gondola or open-top cars, many of which normally lie idle in the late winter. Consequently Thomas H. MacDonald, Chief of the Bureau of Public Roads, recommends that contracts be let during December and January for as great a mileage of roads as possible.

It has been customary to wait until contractors' organizations were ready to begin work before starting the shipment of material. Under these conditions many thousands of open-top cars lie idle during the latter part of February, all of March and the earlier part of April. During the past spring the number of open-top cars that were idle totaled more than 250,000. This, of course, was partly unavoidable owing to the date at which work got under way, following the signing of the armistice. By awarding contracts as early as possible, contractors will be able to ascertain their material requirements at different points, and so will be in position to place orders dependent on rail transportation a considerable time in advance.

While the placing of material in storage, which may result from such a course, involves some expense, it will be small compared to the loss that will result if contractors are not in a position to go ahead with the work because of lack of materials. In view of the experience of 1919 and the greatly increased program for next year, it seems probable, according to the Bureau of Public Roads, that contracts which are not awarded during the winter months will have little opportunity for being supplied with materials which require rail transportation.

## COAL AND PUBLIC UTILITIES.

The strike of the coal miners affects all phases of domestic and commercial life of the country, not the least important being the various public utilities that rely upon coal for power. Such utilities serve individaal citizens, and communities as such, with gas; electric light; electric power used for pumping water, operating street railways and for various commercial purposes; heating from central plants, and other public and semi-public services.

The cutting off of electric power alone would be a serious matter, and the amount of coal used by public utility power plants in this country is enormous. The U. S. Geological Survey reports that during February, March and April of this year 8,445,184 tons of coal were used by such plants, or an average of 665,000 tons a week. As far as weather affects the consumption, this period would approximately be similar to November, December, and January; but it is probable that consumption has increased since then, with more complete recovery from war conditions.

During the same period 2,006,559 barrels of petroleum derivatives were used as fuel, and 5,111 million cubic feet of natural gas; the last increasing in quantity month by month. However, in only fifteen states was it used at all, and in four of these the amount used was insignificant.

More effective is the use of hydraulic power. About 70 per cent. as much electric power was created by this means as by coal. Moreover, the use was more wide-spread, forty-four states reporting hydro-electric power used by public utility plants, the amount being quite considerable in thirty-three

There is not only mining, but also rail transportation to consider. The amount named above is equivalent to about 2,100 45-ton carloads a day. Strikes, blizzards or other causes of decrease in transportation facilities seriously interfere with coal deliveries, as past experiences show. Each year it is demonstrated more convincingly that it is the part of wisdom to use, for public utilities, such sources of power other than coal that nature has provided for the locality in question.

## HOUSTON IN THE FOOD BUSINESS.

Houston, Texas, which has a municipally owned retail market house, has taken over three stalls in the building and is handling fruits and vegetables in competition with its tenants. In order to be fair to other retailers, it charges, itself with all overhead expenses paid by other dealers, including rent, and also pays wages higher than those paid in other stalls. Reports on ten weeks' operation of the city-managed stalls show that it is possible to buy and sell produce in competition with local merchants at both a direct and indirect saving to consumers. The experiment is to be enlarged to include food products other than fruits and vegetables and is said to be already serving as a stabilizing influence in that city market. Competing merchants have become interested in the methods of doing business of the city-operated stalls and appear anxious to try out practices that would enable them to lower their prices.

# NEWS OF THE SOCIETIES

Nov. 12-14.—AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENTS. Annual convention, New Orleans, La. Secretary, Charles C. Brown, Springfield, Ill.

Feb. 9-13, 1920.—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention, Louisville, Ky. Secretary, E. L. Powers, 150 Nassau street, New York.

## National Highway Traffic Association

A public meeting of the North Atlantic Division of the National Highway Traffic Association will be held at the Automobile Club of America, 247 West 54th Street, New York City, at 8:00 p. m., on Friday, November, 7th.

The following program will be presented:

Progress Report of Committee on "Sign Posting for Detours and Thru Routes in Municipalities," chairman, Elmer Thompson secretary, Automobile Club of America.

"Present Status of Impact Tests on Roadway Surfaces," A. T. Goldbeck, testing engineer, United States Bureau of Public Roads.

"Motor Vehicle Traffic which Requires the Use of Cement-Concrete Foundations," W. G. Thompson, state highway enginer of New Jersey.

"Relation of the Motor Truck to the Railroad," C. W. Reid, manager, Transportation Bureau, Federal Highway Council.

Dinner will be served in the Club at 6:30 p. m. The public is cordially invited to attend both the dinner and the meeting. Dinner reservations should be addressed to secretary Elmer Thompson, 247 West 54th St., New York City.

## New England Water Works Association

The November meeting of the New England Water Works association will be held at the Hotel Brunswick, Copley Square, Boston, November 12.

Following an executive committee meeting in the morning and a luncheon, two papers will be read in the afternoon:

"The Prevention and Cure of the Red Water Plague," by Prof. William H. Walker, Massachusetts Institute of Technology, Boston.

"Modern Pumps for Small Water Works," by Creed W. Fulton, New England manager, Gould Mfg. Co.

The Nominating Committee appointed by president Killam to present nominations for officers for the association for the year 1919 have reported as follows:

President, Henry V. Macksey, Supt. of Public Works, Woburn, Mass.

Vice-Presidents: Charles W. Sherman, Consulting Engineer, Boston, Mass.; Frank A. Barbour, Consulting Hydraulic and Sanitary Engineer, Boston, Mass.; Percy R. Sanders, Supt. Water Works, Concord, N. H.; Beekman C. Little, Supt. Water Works, Rochester, N. Y.; James H. Mendell, Supt. Water Works, Manchester, N. H.; William W. Brush, Deputy Chief Engineer, Dept. of Water Supply, Gas and Electricity, New York, N. Y.

Additional Members of Executive Committee: A. R. Hathaway, Water Registrar, Springfield, Mass.; Patrick Gear, Supt. Water Works, Holyoke, Mass.; David A. Heffernan, Supt. Milton Water Works, Milton, Mass.

Secretary, Frank J. Gifford, Supt. Dedham Water Company, Dedham, Mass.; Editor, Henry A. Symonds, Consulting Engineer, Boston, Mass.; Treasurer, Lewis M. Bancroft, Supt. Water Works, Reading, Mass.; Advertising Agent, Henry A. Symonds, Consulting Engineer, Boston, Mass.

Finance Committee: George H. Finneran, Supt. Water Service, Boston, Mass.; George A. Carpenter, City Enginer, Pawtucket, R. I.; Frank A. Marston, Designing Engr., Metcalf & Eddy, Boston, Mass.

## American Association of Engineers

The Board of Directors of the American Association of Engineers in its quarterly meeting on October 11 adopted a resolution announcing a militant attitude of the Association toward licensing and registration of engineers. Every effort will be made to have a license bill enacted in every state in which there is none at present. Chapters were advised to appoint license committees, each of which is to cooperate with the National License Committee in drafting the national bill for adoption in all states. Action will be taken also to insure enforcement of existing license laws. The resolution states that "it shall be the duty of chapter committees to see that the law is enforced, both in letter and in spirit, and that such amendments are made to the law from time to time as experience renders advisable in order that the profession may be kept in a high plane."

That the employment service of the American Association of Engineers is beginning to occupy a strong position in the enginering profession is made evident by the fact that within the last month inquiries have ben received for two eight thousand dollar men and one twelve thousand dollar man. There is a great surplus of positions vacant for draftsmen and junior engineers, paying $200 a month and less. The board of directors of the Association at its meeting on October 11 adopted a resolution favoring the development of the Service Department until it is the most efficient employment service for engineers in the United States.

As an outgrowth of the resolution adopted at the last convention of the American Association of Engineers that a committee should be appointed to promote the non-technical interests of engineers in public service, the board of directors of the American Association of Engineers recently authorized the organization of a Federal Department of A. A. E.

This department will be composed of all engineers who are employed by the Federal Government and will have its headquarters in Washington. The engineers in the different departments and bureaus of the Government will organize into sections which will be a part of the Federal Department. Sections will be organized into local branches. There will be, for instance, the San Francisco Branch of the Navy Section of the Federal Department of the American Association of Engineers. Branches and sections will be subordinate to chapters having jurisdiction over the territories in which they are located.

The Federal Department will be financed in the same manner as the railroad campaign was financed at the beginning; the engineers to be benefited by the department will be asked to subscribe from one to five dollars each to an organization fund, which will provide for the initial outlay and the expansion of the district office in Washington.

By a referendum vote of the membership of the American Association of Engineers, completed on October 15th, the entrance fee of the Association for 1920 was changed from $6.00 to $10.00. The change will be made on December 31.

The Board of Directors of the American Association of Engineers has approved petitions of clubs of A. A. E., at Newport, Rhode Island, New Castle, Pennsylvania; and chapters at Globe-Miami, Arizona, and Terre Haute, Ind. Chapter petitions which have not yet been acted upon have been received from Tulsa, Oklahoma, and Butte, Montana. Chapters were recently established at Columbus, Ohio; Ohio State University; Oil City, Pennsylvania; Buffalo, New York; and Bellaire, Ohio.

The American Association of Engineers announces the appointment of H. G. Shirley, of the Highways Industries Association in Washington as corresponding highway member of the Committee on Salaries of Engineers in Public Service, of which A. N. Johnson, consulting highway engineer of the Portland Cement Association, is Chairman.

The corresponding highway members, in addition to Mr. Shirley, are: Thos. H. McDonald, chief of U. S. Bureau of Public Roads; W. L. Passet, Bureau of Municipal Research, New York: Col. W. D. Uhler, chief engineer, Pennsylvania State Highway Department. B. Fletcher, State Highway Engineer of California; A. W. Dean, chief engineer, Massachusetts Highway Commission and Clifford Older, chief engineer Illinois State Highway Department.

## INDUSTRIAL NEWS

### Well-Known Men Join International Exposition of Municipal Equipment.

Mrs. Jeanne Carpenter, director of the International Exposition of Municipal Equipment in the Grand Central Palace, announces two additions to the permanent staff.

E. J. Dewine who has for the past two years been in the construction division of the U. S. Army, takes charge of the department of streets, asphalt and road machinery. Mr. Dewine has had a wide and varied experience in this field, having begun his experience in 1895 with the Warren-Scharf Asphalt Paving Co., which finally developed into Warren Bros. In 1900 he joined the Southern Paving Construction Co., and for eight years was associated with it, and the jointly owned Southern Clay Mfg. Co. In the succeeding years he was identified with the Southern Contracting Co., the road department of the Barrett Co., and the U. S. Asphalt Refining Co. Mr. Dewine combines with a thorough knowledge of his profession a very wide acquaintance.

J. H. Brewster is a sanitary engineer, and since his discharge from the army has been identified with the engineering department of the New York State of Health, where he had direct supervision of the investigation of plants producing milk or milk products, including investigation and reports on the plants, design, and construction, and general equipment installed. After completing his course in chemical and sanitary enginering at the Rensselaer Polytechnical Institute, Mr. Brewster was connected with the American Water Works and Electric Co., of New York City for nearly four years, as sanitary enginer, having charge of the operation of water purification plants. Later he joined the Indiana State Board of Health for four years. There his work included the approval of plants for water and sewage systems, the construction and operation of purification plants, together with the sterilization of water and sewage, and the chemical and bacteriological work connected therewith. He made surveys of lakes, rivers, and watersheds, and traced the outbreaks of epidemics, as well as other work coming under the control of his department. Mr. Brewster will have charge of the health, water, sewage disposal and milk sections of the Exposition.

**The Engineering Advertisers' Association of Chicago** has just been organized, the membership being limited to advertising and sales executives of concerns engaged in the manufacture of engineering products.

The association was founded by a group of men actively engaged in the production end of advertising work, including H. L. Delander of the Crane Co., P. A. Powers of the Benjamin Electric Manufacturing Co., Glenn H. Eddy of the Green Engineering Co., J. J. Arnsfield of Fairbanks, Morse & Co.. and Albert H. Hopkins of the C. F. Pease Co. It was the opinion of these men that the advertising activities of manufacturers of engineering products have assumed such magnitude as to necessitate an independent organization devoted exclusively to this special field.

P. A. Powers, one of the directors, outlined the purposes of the Association as follows: "We seek to improve present methods of advertising and selling engineering products by trying to bring the truth to bear upon our problems; by each one laying down his own methods and submitting to friendly criticism; by co-operating in various active efforts and by the interchange of ideas and experiences."

The committee in charge of the winter program has arranged for a comprehensive series of lectures which will be delivered at the monthly meetings by men who are recognized authorities in the subjects assigned. Such questions as better typography in engineering advertising, the use of art in advertising technical products, markets and their analysis, the kind of data which should be accumulated by advertising managers, and other very practical topics will be discussed by experts. The membership now includes a great many of the members of the advertising profession who are prominent in their work. The control of the association is vested entirely in advertising and sales directors as it is the intention to limit the membership to men actively engaged in advertising and selling engineering products.

### Standardization of Electrical Products.

At the regular fall section meeting of the Associated Manufacturers of Electrical Supplies held October 14-15 at headquarters in New York City, in addition to the general work of the sections in standardization of various materials and devices, the adoption of the standards approved and recommended by the different sections was discussed and also the plan to have these standards issued as the standards of the association. Other bodies have at various times suggested joint meetings for the consideration of subjects of mutual interest, including the American Institute of Electrical Engineers, Standards Committee, N. E. L. A. Wiring Committees, the Underwriters' Laboratories, Western Association of Electrical Inspectors, Compressed Air Society and others. This led to the suggestion that a general committee be formed from sections, with the approval of the board of governors and counsel, the function of which would be to represent the association in matters of standardization and to evolve procedure by which section standards may become standards of the association and generally to centralize the association's standards work to the end that all interested parties may be advised of proposed action and the necessary provision for same made. Subjects which are expected to come under consideration are:

1. The determination of the relation of the Bureau of Standards at Washington to the initiation of codes, etc.
2. The proposed broadening of the American Engineering Standards Committee.
3. The proposed legislation conferring on the Bureau of Standards the power to establish standards of quality for manufactured product.
4. The desire of other national associations, such, for instance, as the American Institute of Electrical Engineers, to confer and co-operate with the association in the adoption of standards in which there may be mutual interest.
5. The determination of what shall be a standard of the association and the evolution of an orderly process by which, when desirable, the standards adopted by a section may become the standards of the association.
6. The desirability of the collection and preservation of standards already adopted by the various sections in form which shall make them readily available.

All such work would naturally come under the advice of counsel and every possible means taken to avoid complications or anything which might be considered illegal.

**The Lakewood Engineering Co.,** Cleveland, O., announces that Capt. P. H. Brigham, 130th Engineers, U. S. A., recently returned from France after nineteen months foreign service, has received his discharge and has entered the service of the Paving Department of the company as field engineer for New York, New Jersey and New England. Before Capt. Brigham entered the army in May, 1917, he was employed as assistant engineer with the New York State Highway Department with headquarters at Binghamton, N. Y.

**The Ingersoll-Rand Company,** Broadway, New York City, has issued a number of new pieces of literature. Copies may be had free on request to either New York or any of the branch offices.

Form No. 8707 is a forty page, 6x9 inch bulletin on "Little David" pneumatic drills, grinders and saws. It illustrates the various sizes and models of the different machines and contains detailed description concerning the particular tool to use for a given purpose. The descriptive matter is supplemented with a number of tables giving air consumption of the various tools, etc.

Form No. 945, entiled "'Tis a Good Investment," illustrates ER and FR compressors in small machine shops, power houses, garages, etc.

Form No. 954 is an 8½x11 inch sheet descriptive of the "Air Lift Method of Pumping."

# ADVANCE CONTRACT NEWS

ADVANCE INFORMATION
BIDS ASKED FOR

CONTRACTS AWARDED
ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

## BIDS ASKED FOR

### STREETS AND ROADS.

**Ariz., Tombstone. 2 pm, Nov. 17.**
89,377 sq. yd. pavement on 2 sections road in Cochise co.—T. Maddock, state engr.

**Ark., Little Rock. 11 am, Nov. 14.**
72.5 mi. asphaltic macadam (penetration method) pavement in Sebastian co., involving 37.5 acres clearing and grubbing; 12,655 rods fence moving; 301,295 cu. yd. embankment; 10,615 cu. yd. solid rock excav.; 4,040 cu. yd. loose rock excav.; 560 lin. ft. 18-in., 2,465 ft. 24-in., 663 lin. ft. 30-in., 1,433 ft. 36-in. and 6 ft. 48-in. pipe of vitr. clay, metal or rein. concr. (hauling and placing only); 1,510 cu. yd. concr. in culverts; 368 cu. yd. concr. in pipe head walls, 1,853 cu. yd. concr. in bridge abutments; 39,440 lbs. reinforcing metal; 381 lin. ft. I-beam bridges; 960 lin. ft. truss bridges; 680,724 sq. yd. pavements, hauling stone, etc.—Carter & Knoch, civ. engrs., A. O. U. W. bldg.

**Cal.,, Sacramento. Nov. 17.**
20 mi. grading on San Diego-Imperial road between Pine Valley and Tecate divide—State hwy. comn.

**Fla., De Soto. noon, Nov. 25.**
10,000 sq. yd. vitr. brick paving and laying 1,500 ft. 6-in. sewer house connections.

**Ga., LaGrange. Nov. 18.**
13 mi. road between LaGrange and co. line with concr. bridges and culverts, involving 117,000 lbs. steel reinforcing, 957.4 class A concr., 154.8 class B concr., 105 cu. yd. stone rip rap, 248 cu. yd. wet excav., etc. for 16 concr. bridges; clearing, grading, pipe, top soil, etc. on 3 projects, involving 19 acres clearing and grubbing, 1,650 lin. ft. vitr. clay pipe, 127 cu. yd. concr. headwalls, 111,668 cu. yd. earth excav. and borrow, 1,200 cc. yd. rock excav., 45,000 topsoil surfacing, 10 mi. grassing slopes—Garrett & Slack, Bell bldg., Montgomery, Ala.

**Ga., Americus. 10 am, Nov. 21.**
3 mi. fed. aid. proj. no. 102, 1-course concr, or bituminous macadam, or rock asphalt, or Willite asphalt, involving 31,880 sq. yd. pavement, 11,058 cu. yd. common axcav., concr. in culverts and headwalls, 200.5 lin. ft. D. S. V. pipe, 1,017.8 sta. yds. overhaul, 31,880 lin. ft. 2x8-in. wood curb, etc.—Thomas & Hawkins, engrs., 302 Forsyth bldg., Atlanta.

**Ga., Savannah. noon, Nov. 20.**
Grading, draining and paving road from Savannah to line between Chatham and Effingham cos., including culverts, pipes, headwalls and drains, and scarifying, rolling and repairing, involving 17,457 lin. ft. road 18 ft. wide, 34,194 sq. yd. paving under fed. aid proj. no. 103, and 51,103 lin. ft. 15-ft. road, 90,840 sq. yd. pavement; also grading, draining and paving 65,637 lin. ft. 16-ft. road from Savannah to line between Chatham and Bryan cos., involving 116,688 sq. yd. pavement and 3 bridges—R. Butler, clk., co. comrs.

**Ind., Hammond. 10 am, Nov. 19.**
Grading and paving roadway—Bd. pub. wks.

**Ind., Albion. 2 pm, Dec. 2.**
Road in Washington twp., Noble co.—H. C. Erwin, co. aud.

**Ind., Anderson. 10 am, Nov. 17.**
9,340 ft. concr. road in Lafayette twp. and 2,165 ft. concr. road in Van Buren twp., Anderson co.—E. T. Flahavin, co. aud.

**Ind., Fort Wayne. 10 am, Nov. 17.**
16,012 ft. road in Wayne twp., Allen co.—A. C. McCoy, co. aud.

**Ind., Lebanon. 11 am, Nov. 19.**
Gravel road on co. line between Hendricks and Boone cos.—C. Goodwin, aud., Boone co.

**Ia. Oskaloosa. 8 pm, Nov. 17.**
Paving in various streets—H. C. Hawkins, engr., city hall.

**Ia., Leon. 8 pm, Dec. 3.**
10,000 sq. yd. paving with brick, rein. concr., sheet asphalt, asphalt concr., or bituminous concr., est. $150,000—C. A. Shockley, 740 Reserve Bank bldg., Kansas City, Mo.

**Kan., Emporia. 1.30 pm, Nov. 26.**
Section of fed. aid proj. no. 30 in Lyon co., 23.00 ft. 18--ft. road of 1 course concr., 2-course concr., monolithic brick, or bituminous filled brick on sand cushion with concr. base, with 5-ft. earth shoulders on each side, etc., involving 16,406 cu. yd. earth 47,400 sq. yd. paving, 639 cu. yd. concr. in culverts and bridges and 25,933 lbs. reinforcing steel—G. L. Miller, co. clk.

**La., New Orleans. noon, Nov. 24.**
11.3 mi. Melville-Palmetto hwy. in St. Landry parish; 19.8 mi. Alexandria-Oberlin hwy. in Rapides parish; and 8.05 mi. Coushatta-Shreveport hwy. in Red River parish; also following sections of New Orleans-Hammond hwy.; 14.27 mi. from Pontchatoula to Maine; 18 mi. from Manchac to Labranch; 15.93 mi. from Labranch to West End, Tangipahoa, St. John the Baptist, St. Charles and Jefferson parishes—Duncan Buie, state hwy. engr., 736 Maison Blanche annex.

**Me., Augusta. 11 am, Nov. 19.**
7.05 mi. state hwy. in town of Enfield, grading, draining and gravel-surfacing—P. D. Sargent, chf. engr., state hwy. comn.

**Md. Baltimore. noon, Nov. 28.**
State road in Faulkner—P. H. Zouck, chn., state road comn., 601 Garrett bldg.

**Mich., Lansing. 1.30 pm, Nov. 17.**
Improving 6.443 mi. road in Tobacco twp., Gladwin co., consisting of shaping road drainage structures and gravel surfacing to width of 16 ft.—F. F. Rogers, state hwy. comr.

**Mich., Lansing. 1.30 pm, Nov. 18.**
Improving 8.068 mi. road in Arenac twp., Arenac co., by shaping road and surfacing to width of 16 ft. with gravel—F. F. Rogers, state hwy. comr.

**Mich., Lansing. 10 am, Dec. 2.**
Improving 48.503 mi. road in Powell, Champion, Ishpeming, Marquette and Negaunee twps., and Negaunee city, Marquette co., by grading and drainage structures, involving 231 acres clearing; 34,385 sq. yd. grubbing; 474,327 cu. yd. earth, 81,610 cu. yd. loose rock, 5,132 cu. yd. solid rock and 21,778 cu. yd. ditch excav.; 89,202 lin. ft. guard rail; 1,667 cu. yd. retaining wall, (rubble); 63,231 lbs. steel reinforcement in culverts; 12,912 lin. ft. installing corrugated iron culverts, etc.—F. F. Rogers, state hwy. comr.

**Mich., Lansing. 1.30 pm, Nov. 17.**
Improving 7,120 mi. road in Sylvan twp., Washtenaw co., involving shaping road and drainage structures—F. F. Rogers, state hwy. comr.

**Mich., Freeman. Nov. 30.**
1 mi. 12--ft. class B state reward road and 1½ mi. 12-ft. road in Glare co.—J. W. Wilson, twp. clk.

**Minn., Crookston. 2 pm, Nov. 24.**
12 mi. fed. aid proj. no. 80, involving 13 acres clearing and grubbing, 37,993 cu. yd. excav., 33,431 cu. yd. haul, 1,398 lin. ft. 12 to 30--in. portable culverts, 48 rein. concr. culverts, and 14.229 cu. yd. gravel surfacing; 10 mi. fed. aid proj. no. 94, involving 82,774 cu. yd. excav., 86,516 cu. yd. haul, 326 lin. ft. 12 to 36-in. portable culverts, 12,000 cu. yd. gravel surfacing, etc.; 1½ mi. fed. aid proj. no. 1913, involving 14,316 sq. yd. concr. paving and 14,320 ft. drain tile, all in Polk co.—H. J. Welte, co. aud.

**Mo., New Madrid 2 pm, Nov. 17.**
Grading, clearing, ditching, rock surfacing and laying tile and metal pipe culverts on 12.05 mi. road in New Madrid co.—C. V. Hansen, hwy. engr.

**Mont., Helena. 2 pm, Nov. 20.**
Grading, draining and gravel surfacing 3.6 mi. fed. aid proj. no. 15 in Rosebud co.; grading, draining and gravel surfacing, etc. 2.84 mi. fed. aid proj. no. 40 in Gallatin co. and one 50-ft. steel span over East Gallatin river; grading, draining, gravel surfacing, etc. 26 mi. fed. aid proj. no. 53 in Yellowstone co.—Chf. engr., state hwy. comn., Capitol bldg.

**Nev. Carson city. noon, Nov. 18.**
16.67 mi. state hwy. from Lovelock to Zola, Pershing co., involving 40,000 cu. yd. excav. 105,503 sq. yd. 5-in. gravel surface, 200 cu. yd. class A concr., 65 cu. yd. class B concr., 380 lin ft. 12-in., 694 lin. ft. 18-in., 200 iln. ft. 24-in., and 130 lin. ft. 30 to 36-in. metal pipe, etc.; also 2.76 mi. state hwy. in Washoe co., involving 12,300 cu. yd. excav., 346 lin. ft. 15-in., 140 lin. ft. 18-in., 26 lin. ft. 24-in. and 28 lin. ft. 30-in. metal pipe, 35 monuments, etc.—C. C. Cottrell, state hwy engr.

**N. J. Atlantic City. 3 pm, Nov. 20.**
Improving portions of streets, including dredging waterway and depositing dredging materials on streets, involving 94,000 cu. yd.; setting 20,200 lin. ft. wood curbing, graveling 40,700 sq. yd. driveways and 12,800 sq. yd. sidewalks and 14,750 sq. yd. grass plots; constructing 350 lin. ft. terra cotta pipe culvert and 396 lin. ft. cast iron pipe drains—J. W. Hackney, city engr., 22 city hall.

**N. Mex. Santa Fe. 2 pm, Nov. 25.**
1.71 mi. Tijeras Canyon Cooperative Forest Aid proj., in Bernalillo co., involving 2,866 cu. yd. class 1, 545 cu. yd. class 2 and 517 cu. yd. class 3 excav., 2,741 cu. yd. class 1 borrow, 276 lin. ft. 18 to 36-i-n. corrugated metal culvert, etc.—L. A. Gillett, state hwy. engr., Capitol bldg.

**N. Y. New York. 2 pm, Nov. 14.**
Furnishing 100,000 wood paving blks.—E. F. Boyle, pres., boro of Manhattan.

**N. Y. Lockport. 2 pm, Nov. 14.**
Improving co. roads as follows: 2.07 mi. road in town of Hartland with bituminous macadam; 2.26 mi. bituminous macadam in town of Royalton; 1.39 mi. bituminous macadam in Royalton; 2.3 mi. concr. road between city and town of Lockport.—F. H. Krull, clk., bd. supervrs. courthouse.

**N. C. Raleigh. noon, Nov. 18.**
21 mi. state hwy. in Lenoir co., involving 6.82 acres clearing and grubbing; 29,650 cu. yd. earth excav.; 89,237 cu. yd. earth borrow, 200,067 sq. yd. concr. or sheet asphalt, or warrenite or topeka pavement; 1,066.11 cu. yd. class A., 212.63 cu. yd. class B and 62.41 cu. yd. class C. concr. for structures; 74,877 lbs. reinforcing steel for structures; 1,400 lin. ft. 4-in. tile drain; 402 lin. ft. 6-in. terra cotta pipe, 18 lin. ft. 12-in. pipe and 40,194 ft. drainage ditches—W. S. Fallis, state hwy. engr.

**O. Columbus. Nov. 14.**
43 mi. new roads of various types of concr., macadam and brick in Adams, Auglaize, Jefferson, Lucas, Morrow, Mercer, Medina, Morgan, Perry, Pickaway and Tuscarawa cos., est. cost $1,205,050 also bridge in Trumbull co.—State hwy dept. A. R. Taylor, hwy. comr.

# Municipal Journal & Public Works.

City County State

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**Contributed Articles and Reports**

*Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.*

*City officials and civic organizations are particularly requested to send to Municipal Journal and Public Works regularly their annual and special reports.*

**Information Bureau**

*The Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.*

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## MILLIONS IN SEWAGE AND GARBAGE.

About two thousand billion gallons of sewage flow through the sewers of American cities in a year. If the valuable ingredients in this could be recovered so as to yield a profit of only one cent a thousand gallons, the total profit would be twenty million dollars a year.

About ten million tons of garbage a year are created in this country. The grease and tankage in this could be sold for probably $30,000,000. The net profit would be less than this by the cost of recovering the grease and tankage.

There is little question that there is more than $50,000,000 of real value in the grease and fertilizer which is recoverable annually from the country's sewage and garbage. But if the recovering costs $100,000,000, or even $51,000,000, it will not be performed. Chemists, sanitarians and others have for years been attempting to solve the problem of making possible the securing of returns that exceed the cost of the process. A discussion of some of the fundamental conditions of the problem will be given in the next issue.

## PAINTING STANDPIPES.

We have noticed recently an interest in the subject of the painting of standpipes, as evidenced by the number of inquiries on the subject that have been addressed to our Information Bureau. We therefore feel sure that the paper on this subject published in this issue will be welcomed by many. We also believe that there are many water works superintendents who should give the matter thought but are not doing so. Few standpipes can go unpainted for many years without rusting, and a rusting standpipe is approaching collapse.

## THE MUNICIPAL BOND MARKET

October set a new record for the sale of municipal bonds, the total amount of such sales being about $65,000,000, which is nearly eight times as great as the sales for October, 1918, and nearly twice as great as any previous October. Also, the bond sales for the ten months of this year have totaled $582,000,000, which exceeds by nearly 40 per cent the largest previous total for a similar period. One of the biggest issues was that of $3,000,000 by the city of Pittsburgh, sold on a 4.29 per cent basis. The territory of Hawaii sold $1,500,000 on a 4.28 per cent basis, while other large borrowers in October were the state of Michigan, $1,500,000; Jersey City, $2,151,000; Des Moines, $1,025,000, and Phoenix, Ariz., $1,300,000.

These bonds, sold in the latter part of the year, are most of them, it is probable, to be used for construction of public works in 1920. These and other indications point to the conclusion that public officials are coming to the conclusion that prices of material and labor for public works are not likely to fall for a considerable time and may even rise further, and that there is no valid argument in favor of longer postponing public works. If only the materials and labor can be obtained, next year should be a record year in the construction of such works.

# PAINTING IRON AND STEEL STANDPIPES!

## Conclusion of the Author from Data Collected from Cities All Over the Country and From Personal Experience—Thorough Cleaning and Immediate Painting with Red Lead Recommended.

By CHARLES W. SHERMAN.*

The proper maintenance of an iron or steel standpipe involves periodic painting to prevent corrosion which would weaken and ultimately destroy the structure. The protection of the exterior surface involves no particular difficulty, as it can be inspected at any time, and the coating can be replaced whenever it may appear necessary or desirable. A paint coating on the outside surface of the standpipe is subject to practically the same conditions as one on a bridge or building. The interior surface is, however, difficult to protect, being constantly in contact with water. Moreover, it can be inspected only at intervals and with some difficulty, and it is often difficult or impossible to leave the standpipe empty for a sufficiently long period to clean and paint the surface in the most desirable way.

The durability of a protective coating on the interior surface of a standpipe is dependent not only on the qualities of the coating itself, but also on the character of the plates to which the coating is applied (whether wrought iron or steel), the cleanness, dryness, and temperature of the surface when the coating is applied; the character of workmanship; the character of the water; the amount of ice formation in winter; fluctuations in the water level, etc.

Data relative to the conditions existing when coatings were applied have comparatively seldom been made a matter of record. Indeed, it is more often than not the case that the kind of paint and the quantity used are not recorded. Consequently, the amount of definite information obtainable, even by extended inquiry, is comparatively limited, and much of it is of doubtful value.

In an attempt to bring together such information as may be obtainable, relative to actual experience with standpipe paints, Messrs. Metcalf & Eddy sent inquiries to water works in the northern and eastern parts of the United States where iron or steel standpipes are in use, requesting information as to the dates of painting, kind of paint used, preparation of the surface for painting, and other significant data. In general, the water works superintendents were generous with their responses, which were received during the winter of 1916-17, but in a disappointingly large number of cases the responses were, in effect, —"The writer has been here but a short time. The former superintendent left no records and I do not know what paint was used or when it was applied."

The accompanying tabulation contains the significant data received in response to this inquiry, together with some information available from other sources. Unfortunately, it has not been practicable to bring the information down to date before presenting this paper. The returns, however, represent the conditions existing up to the time the United States entered the war, and it is probably fair to assume that very little in the way of standpipe maintenance has been done during the period of the war.

The data tabulated are not susceptible of being summarized or averaged. In a few cases it will be noted that the standpipe has not been painted since erection. There are doubtless cases in which the quality of the water is such that it protects rather than corrodes the metal. Such cases are, however, rare and the experience tabulated seems to indicate that as a rule an iron or steel standpipe should be thoroughly cleaned and painted inside, at least as often as once in four or five years. Perhaps, however, if the cleaning were as thorough as would be accomplished by means of the sand blast, and if a protective coating were then properly applied, the interval between paintings could be materially extended.

In response to the letter of inquiry, Mr. A. H. Kneen, of Philadelphia, sent a report entitled "Painting the Inside of Standpipes," which is submitted herewith as an appendix, and which contains the best and most complete comparative data which have come to the writer's attention.

Mr. Kneen painted two standpipes with vertical stripes of different kinds of paint, and observed the conditions after two or three years of service. The only paints which gave reasonably good service were a red oxide of iron paint, and red lead.

Most of the paints used were undoubtedly proprietary articles, and although one red oxide of iron paint showed "good" or "very good" results, several others characterized the same way in his tabulation gave "bad" or "very bad" results. It is to be noted, too, that red lead when used was employed only in the first coat, yet the results were characterized as "good" or "very good." It is not impossible, therefore, that two or three coats of red lead would have shown better protection than any of the other paints.

The engineers of the Metropolitan Water Works have adopted the policy of cleaning the steel by sand blast, and applying three coats of red lead to the interior surface of their steel standpipes. The following quotation from the fifteenth annual report of the Metropolitan Water and Sewerage Board describes the cleaning and painting of the Bellevue Hill standpipe:

> "On March 25 the tank was taken out of service and drained, and the work of sand blasting and painting the steel was begun March 30 by the W. L. Waples Company of Boston, subcontractor for this work. The plant used consisted at first of a twenty horse-power gasoline-engine-driven air compressor, a compressed air reservoir, two lines of air hose and two nozzles. Sand blasting was stopped in the latter part of the afternoon of each day, and the cleaned surfaces were painted before rusting commenced. The force employed included 1 foreman, 2 painters, who also did sand blasting, and 1 helper. This force could sand blast and paint an area of about 330 sq. ft. per day. Later, in order to increase the rate of progress, a second compressor, operated by an automobile engine, was installed on April 19. The entire inside and outside surface of the tank, having an area of 35,650 sq. ft., was sand blasted and painted. Work was completed June 14, with the exception of the third coat on the outside, which has been deferred until after the masonry tower which encloses the tank is completed. All painting materials were furnished by the department, but were mixed by the contractor under the direction of the engineer. For the inside of the tank, National Lead Company's red lead in oil paste, litharge, and Spencer-Kellogg & Son's boiled linseed oil, were used; the first coat natural color, the second and third coats tinted with lampblack in oil. For the outside of the tank, red lead paste, raw linseed oil, and drier were used for the first coat, and for the second coat white lead, raw linseed oil, turpentine, and drier tinted with lampblack were used. One gallon of red lead paint was sufficient to cover 700 sq. ft. of surface with one coat. The subcontractor's price for sand blasting and painting the tank was $1,600. . . ."

The writer inclines to the opinion that the method just quoted represents the best practice of the present time. He would put especial emphasis on the thorough cleaning of the metal, and the *immediate* application of the paint to the cleaned metal before the latter has cooled and moisture has condensed upon it.

> "Every specification for painting bristles with clauses prescribing what shall or shall not be done, and still the fact remains that there are more failures than even indifferent successes, especially on work painted at the shops before shipment. The causes for the irregular and indifferent results are not difficult to ascertain. They are the improper application of the paint to dirty, greasy, moist or chilled, rusty or mill-scaled surfaces. No marked improvement in these uncertain results can be had until the same importance is attached to the 'paint question,' not only on paper, but in the actual supervision of the painting in all of its stages, as is given to the minutest construction details."*

With regard to the coating to be applied to the metal after cleaning, it appears probable that not only red lead, but several of the graphite and red-oxide-of-iron paints, and perhaps certain enamel-like coatings, will give satisfactory protection. From such information as he has, the writer believes red lead to be the best. Wood, in "Rustless Coatings," says, "The protective qualities of a well-oxidized pure red lead and a pure oil paint, properly applied to any structure under any exposure, except to the action of hydric-sulphide gas, cannot be gainsaid." It has been used for many years for painting the bottoms of steel and iron ships, and has given the best satisfaction of any paint used for that purpose. No other substance has been put to such severe trial and shown so good results;

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†Paper before the New England Water Works Association.

*Of Metcalf & Eddy, Consulting Engineers, Boston, Mass.

*"Rustless Coatings," by M. P. Wood.

but unfortunately the use on standpipes has been comparatively limited,—probably because of a lurking, but unfounded, fear of lead poisoning if the water remains in contact with red lead paint.

It is obviously unfortunate that the data available are so fragmentary and inconclusive. It is to be hoped that the superintendents having charge of iron and steel standpipes will realize the necessity for more definite information and will make careful record of all the conditions affecting the durability of standpipe coatings, and that at some future time it may be possible to bring the data together and draw positive conclusions from them.

*Note: The tabulation of data referred to will be given in the next issue.*

*The paper by A. H. Kneen, referred to by Mr. Sherman, is given below.*

To obtain better information as to a suitable paint for protecting iron under water, the writer decided to paint the inside of a standpipe with different paints, for experimental purposes.

The first samples were applied in August, 1909, the iron being carefully cleaned with wire brushes, and loose scale chipped to clean iron. The results of our experiments to date may be of interest to water works having standpipes and towers, and the results that we have obtained to date are tabulated herein.

Our experiments have been applied particularly to the inside of the tank, as we have found that the outside can be protected by a good lead, iron oxide or graphite paint, which, if of proper quality and properly applied, will protect the iron for at least five years, unless subject to unusual conditions. Usually the appearance of the outside will call for painting before the necessity.

In 1910 a smaller tank than the first one used for experiments was erected, and this was painted on the inside with different paints, and is still being used for experimental purposes as it is more accessible than the first.

The kinds of paint applied to the two tanks, and the results found by inspection, are listed in Tables 1 to 4—Tables 1 and 2 covering the first tank, and Tables 3 and 4 covering the second tank. The manufacturers of the various paints used have been omitted.

**Table No. 1**—Tank 40 ft. in diameter by 50 ft. in height. Samples about 25 ft. in width by 50 ft. in height.

| | Kind of Paint. Two Coats. | Condition. Date of Inspection. | |
|---|---|---|---|
| | Date applied, August, 1909. | Tank Half Full of Water. April 27, 1911. | Tank Empty, September, 1912. |
| 1. | Iron oxide | Good. | Fair. |
| 2. | Iron oxide | Bad. | Bad. |
| 3. | Graphite—black | Bad. | Bad. |
| 4. | Asphaltum — black | Very bad. | Very bad. |
| 5. | Portland cement (brushed on) | Very bad. | Very bad. |

**Table No. 2**—Same tank as Table No. 1. Samples about 8 ft. in width by 50 ft. in height.

| | | Condition. Date of Inspection. | |
|---|---|---|---|
| | Date applied, September, 1912. | Tank Half Full May, 1914. | Tank Empty, May, 1916. |
| 1. | Oxide of iron — red | Very good. | Very good (best). |
| 2. | Oxide of iron — black | Very bad. | Fair. |
| 3. | Tar base — black | Very bad. | Very bad. |
| 4. | Oxide of iron — red | Fair. | Bad. |
| 5. | Oxide of iron — red | Fair. | Bad. |
| 6. | Pitch — black | Very bad. | Very bad. |
| 7. | Graphite — carbon | Very bad. | Fair. |
| 8. | Graphite — carbon | Very bad. | Fair. |
| 9. | Oxide of iron — red | Fair. | Good. |
| 10. | Car. coating — black | Good. | Very bad. |
| 11. | Oxide of iron —red | Fair. | Fair. |
| 12. | Oxide of iron — red | Fair. | Bad. |
| 13. | Oxide of iron — red | Very bad. | Bad. |
| 14. | Tar — black | Very bad. | Very bad. |
| 15. | Red lead, first coat; Metallic brown, second coat | Good. | Good. |
| 16. | Flexible tank, oxide of iron — red | Good. | Good. |

Repainted May, 1916, with iron oxide paint, and experiments discontinued.

**Table No. 3**—Tank 30 ft. in diameter by 39 ft. in height. Samples about 16 ft. wide and 39 ft. high. Painted May, 1910.

| | | Condition. Date of Inspection. | |
|---|---|---|---|
| | Kind of Paint—Two Coats. | Tank Half Full of Water. Feb., 1911 | Tank Empty. Sept., 1914. |
| 1. | Graphite | Bad. | Bad. |
| 2. | Rubber paint | Bad. | Bad. |
| 3. | Oxide of iron — red | Good. | Very good. |
| 4. | Oxide of iron — red | Bad. | Bad. |
| 5. | Red lead (1), metallic brown (2) | Fair. | Good. |
| 6. | Oxide of iron—red. | Good. | Bad. |

**Table No. 4**—Same tank as Table No. 3, repainted on inside, September, 1914. Twelve samples about 8 ft. by 39 ft. in height.

| | Kind of paint—Two coats. | Inspected Dec. 26, 1916. Tank Half Full of Water. |
|---|---|---|
| 1. | Oxide of iron — red | Good. |
| 2. | Pitch — black | Bad. |
| 3. | Oxide of iron — red | Bad. |
| 4. | Asphalt and Portland cement | Bad. |
| 5. | Red lead, first coat; Metallic brown, second coat—brown | Very good. |
| 6. | Red lead lute, first coat, metallic; second coat, brown | Bad. |
| 7. | Oxide of iron — red | Bad. |
| 8. | Tank paint, pitch — black | Bad. |
| 9. | Tank paint, oxide of iron — red | Bad. |
| 10. | Roof coating — pitch — black | Bad. |
| 11. | Tank paint — oxide of iron — red | Good. |
| 12. | Sticktite No. 3 pitch (black) | Bad. |

Samples marked "Good" and "Very good" had comparatively few tubercles on surface and no scaling or blistering. Samples marked "Fair" had more tubercles and some scaling and blistering. Samples marked "Bad," the surface was fairly well covered with tubercles and some blistering and separations had taken place. Samples marked "Very bad," the surface was generally covered with tubercles and the paint badly scaled and very badly blistered. In the painting of September, 1914, the red lead and metallic brown paint used was mixed on the ground by our chief painter and best quality of everything used.

### COST.

Labor cost, which covers cleaning and the application of two coats of paint, is usually less than $20.00 per thousand square feet. The amount of paint required for two coats on the inside has averaged 5½ gal. per thousand square feet, or one gallon of paint covers about 180 sq. ft. of iron with two coats. Assuming that the paint costs $1.50 per gallon, the cost of paint for two coats would be $8.25 per thousand sq. ft., which, added to the labor cost, makes the total cost $28.25 per thousand square feet.

The iron can be prepared for the paint by the sand blast, and other protective coatings can be secured with five-year guarantees, but the expense of such cleaning and such application at the prices quoted is, in our judgment, too great to warrant the expenditure.

Under the writer's supervision, we have had the inside of fifteen standpipes painted and repainted in the past seven years, the combined area of which is over 112,000 sq. ft., and the results obtained are similar to those obtained in the experimental tanks. Our conclusion to date is that paints having pitch or asphalt for a base, applied in this manner, are not suitable for iron in contact with water, but that two-coat work with a good quality of iron oxide paint or a paint with a good red lead base for the first coat, and an iron oxide paint for the second coat, if the iron is properly cleaned and the paint is properly applied, will protect the iron in contact with water for at least four years, unless the water is of unusual quality or the conditions are different than usually met with in water-works practice.

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## BREAKING UP A CONCRETE BRIDGE.

A reinforced concrete bridge 30 feet long and 16 wide and its concrete abutments (one of which had been undermined by a flood) in Iowa were removed by dynamite recently for the county commissioners by Jay J. Jackson, a professional dynamiter, it being believed that this would be cheaper and quicker than by using sledges. There were three girders, each 2½ x 3 feet and strongly reinforced.

The earth was first blasted out from behind the abutments by discharging simultaneously a pound of dynamite in each of several holes three feet deep and about 6 feet apart. The abutments were about 8 inches thick, but with a projection under each girder. Directly under each of these projections was placed 3½ pounds of dynamite. These were fired simultaneously and let girders and floor fall into the water, which was three feet deep.

Five sticks of dynamite were then tied together and lowered through a hole cut in the floor, held in contact with a girder and exploded. By repeating this process several times the girders and floor were completely broken up. Fast dynamite—60 per cent. straight N. G.—was considered best for such work. Better results could have been obtained by firing all the shots together, but the proximity of buildings made it inadvisable. As it was, there was no flying debris.

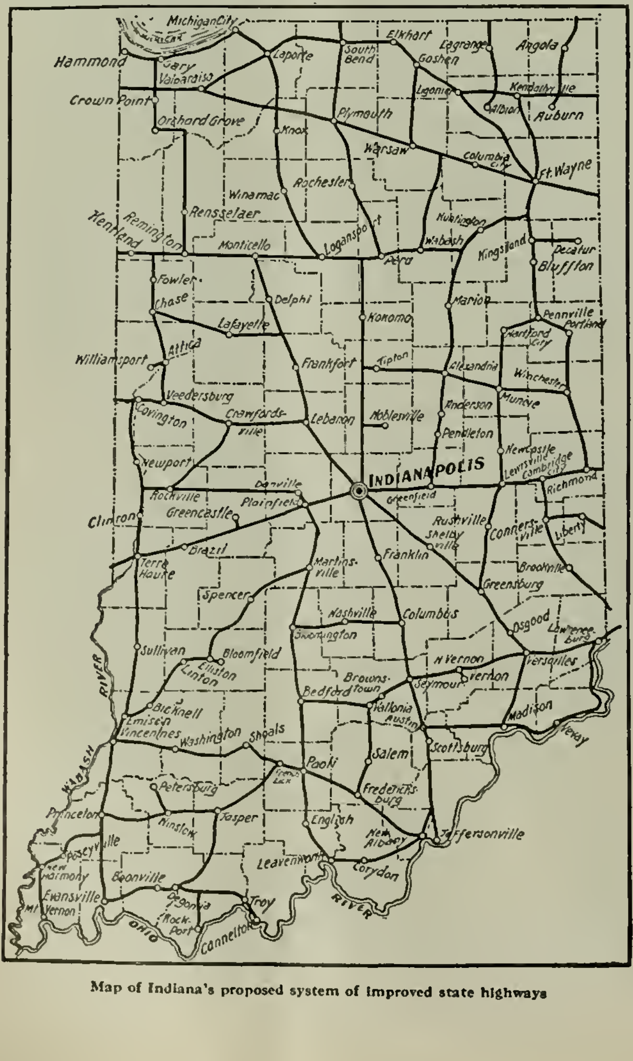
## COLORADO HIGHWAYS.

Up to November, the Federal Aid projects in Colorado approved by state and national government totaled 117 in number and 882.9 in miles, the estimated cost being $5,425,210. Of these, 84.35 miles are to be of concrete, and the remainder only graded, graded and drained, or graded, drained and surfaced. Two bridges to cost $140,000 are included also.

In addition, there are state-aid projects totaling 10.6 mile of concrete, estimated cost $148,237; 17 miles of grading, draining and surfacing estimated to cost $154,180, and two bridges to cost $4,807. The state will also pay $197,314 as its share of forestry road projects.

## INDIANA'S STATE HIGHWAYS.

One hundred million dollars will be spent by the highway commission of Indiana during the next ten years, according to governor Goodrich. This commission was provided for by a highway law passed this year, and has already awarded contracts for about 134 miles of road. The specifications adopted by the commission provide for cement concrete, bituminous concrete, and monolithic brick, and bids are invited for all three in each case. So far the contracts let total 121 miles of concrete and 13 miles of bituminous concrete. Seven contracts have been let for the "National Road," three for "Lincoln Highway," three for "Madison Road," three for "Range Line Road," two for "French Lick Route," and one for "Niles Road," " Michigan Road" and "Louisville Road." The proposed system of state highways, as shown by accompanying map, covers the entire state quite completely.



Map of Indiana's proposed system of improved state highways

The commission has chosen as director L. H. Wright, who has been affiliated with various farm organizations for a number of years. As chief engineer it appointed H. K. Bishop, who for two years was district engineer of the U. S. Bureau of Public Roads in charge of Federal Aid in Ohio, Pennsylvania, Delaware, West Virginia, Maryland and North Carolina.

## ELECTRIC WELL PUMPING IN SAVANNAH

An electrically driven deep-well pump has recently been put into service by the city of Savannah, Georgia, which is furnishing 4,000,000 gallons of water a day. The water comes from a well 519 feet deep, the top 110 feet of casing being 24 inches diameter, and the remainder 16 inches. A Layne & Bowler centrifugal pump is placed just above the bottom of the twenty-four-inch casing, and is driven by a 200 h. p. Westinghous Electric vertical induction motor, 2200 volt, 1175 revolutions per minute.

The well water is not only purer than that previously pumped at the river station, but is softer than any well water previously used by the city, which comes from different water-bearing strata. Contracts were let for five wells, the pumps in the others to be driven by one 100 h.p., one 200 h.p., one 250 h.p., and one 300 h.p. motor. All the motors are above ground except one, which is in a pit set under the street pavement.

The cost of operating this electric pump is estimated to be $10 a million gallons or $40 a day, while the plant which it replaces cost $65 a day to pump one million gallons.

## WATER WORKS FOR A SMALL VILLAGE

### Place of Five Hundred Population Has Spring Water Pumped to Water Tank, Fire Protection and Sewerage System.

The village of Montague, Mass., although having a population of only 500, has a public water supply which furnishes fire protection and also rendered possible the construction of a sewerage system. There are in the village about one hundred houses which can be served by the water works system, and ninety of these are now using it.

Formerly the inhabitants of the village obtained their supply from individual private wells, but about one-third of these went dry every summer. E. L. Bartlett, who owned property in the village, decided that this condition ought to be remedied and utilized springs near the village from which water emerged through clean gravel, which water when analyzed by the State Board of Health was pronounced to be as good as any to be found in the state. These springs were developed and the water from them collected in a reservoir, and about three miles of water mains were laid, which permitted carrying the water to practically all of the houses in the village. Seven fire hydrants have been located in the village and connected with the distribution system.

The springs were about on the same level as the village and pumping was therefore necessary. A tank was erected, enclosed in a tank house, and a pumping plant. The value of the entire plant, including reservoir and buildings, at the present prices would be about $12,000. While studying the proposition, a measurement of the

RESERVOIR THAT FURNISHES SUPPLY.
All the water is from springs.

flow of the spring showed that this amounted to more than a million gallons a day, which was several times what would be required for the use of the village for many years to come with normal growth. Owing to the small amount of money which could be used for operation, a steam pumping plant was impracticable, and as the flow from the springs was many times the demand, it was decided to put in a water ram. Three 4-inch Rife rams were installed about eight years ago and are still working satisfactorily, but recently there appears to be a slight clogging of the pipes, probably from corrosion. This plant can deliver 20,000 gallons a day. As an emergency measure, Mr. Bartlett has also installed a Rumsey triplex electric pump, which has been used occasionally to supplement the water supplied by the rams. Two years ago this system supplied water for running a steam-shovel on railroad work a mile and a quarter away, the shovel using 4,000 to 7,000 gallons a day, and during this time the electric pump was used a considerable part of the time.

**PUMP HOUSE, CONTAINING RAMS AND ELECTRIC PUMP.**

The water plant was installed in 1911, and in 1913 the town put in a sewerage system at a cost of about $5,000, the sewage being discharged into the river below the village.

Although the owner of the plant, Mr. E. L. Bartlett included fire hydrants in the system and they have been used for extinguishing fires and have secured reduced insurance rates for property owners, the village has never paid anything for this fire protection. Since the water was put in the insurance rate has been very materially decreased. Recently the village purchased at a cost of $2,000 a combination chemical and pumping engine (shown in the accompanying illustration) and is placed in class E by the underwriters and has been given to understand that it will probably be placed in class D, which will reduce the rate still more. The water tank gives 20 to 35 pounds pressure at the street level. Property in the village has increased from 30 to 40 per cent in value since the plant was put in, which increase is claimed to be due very largely to the water system and the sewerage system which it made possible.

The charges for water for family use are $10 per year per family, with $3 for each additional faucet, $4 for bath tub and $4 for water closet.

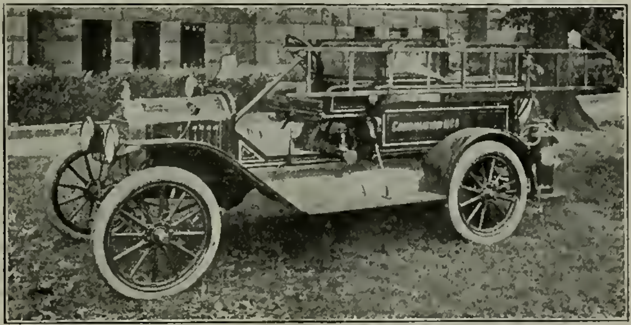
## WISCONSIN HIGHWAY WORK FOR 1920.

More than $6,000,000 worth of road work, to be performed with Federal and state aid, is contemplated by the state of Wisconsin for the year 1920. There are in all 93 different projects scattered throughout the various counties. Of the cost of each of these projects, the Federal government and the state will pay two-thirds and the county one-third. This estimate does not include any work to be done without such aid.

The kind of work, the number of projects employing each kind, and the estimated cost of the total amount of each kind of work, are shown by the accompanying table. It is seen that, of the 93 projects, 24 do not include surfacing the road. Of the remaining 69, 32 include concrete surface, the total estimated cost of these concrete projects totaling $2,962,500, which is more than half of the total estimated cost of all projects which involve surfacing. Surfacing with gravel, disintegrated granite or shale is called for in 27 projects, of which the total estimated cost is $1,380,200. Two projects, estimated to cost $102,000, employ bituminous macadam for the surface construction. The surface treatment on the remainder consists of clay, sand clay or top soil.

END VIEW OF TANK HOUSE.
Height of Water Gauge Seen at Left Side of House.

In addition to the federal and state-aid highway work, it is expected that there will be considerable bridge work done in the state. Chapter 313 of the laws of 1919 requires that the Highway Commission notify each county of the bridges which, in its opinion, are dangerous for travel and should be rebuilt immediately. The Highway Commission has notified the counties of the bridge work which, under this law, should be done



MONTAGUE'S CHEMICAL AND PUMPER.

in 1920. This work will be paid for with county and state aid funds and will all be concrete construction except in one case. The bridges needing re-construction number 51, of which 37 are estimated to cost not over $5,000 a piece. The total estimated cost of these 37 is $86,750, the several costs ranging from $200 to $5,000. Of the more expensive bridges the total estimated cost is $171,550, the individual costs ranging from $5,700 to $57,000. The last is the only bridge not planned to be of concrete, and this will be a steel bridge containing six 70-foot plate girders to be built in the city of Tomahawk.

Douglas county has recently held a special election at which it voted $1,200,000 for improving 174½ miles of road, of which 19 miles will be of concrete, 129 miles will be gravel and 26½ miles will be graded only. Only $50,000 of this is included in the Federal and state aid work listed above.

**Federal and State Road Projects in Wisconsin for 1920.**

| | Number of Projects | Estimated Cost |
|---|---|---|
| Grading, draining and culverting | 22 | $1,053,000 |
| Grading, draining, culverting and 18 ft. concrete surface | 28 | 2,767,500 |
| Grading, draining, culverting and 20 ft. concrete surface | 2 | 93,000 |
| Grading, draining, culverting and 24 ft. concrete surface | 1 | 36,000 |
| Grading, draining, culverting and 16 ft. concrete surface | 1 | 66,000 |
| Grading, draining, culverting and gravelling | 23 | 1,061,850 |
| Grading, draining, culverting and surfacing with disintegrated granite | 1 | 24,000 |
| Grading, draining, culverting and surfacing with shale | 3 | 94,350 |
| Grading, draining, culverting and claying | 3 | 102,000 |
| Grading, draining, culverting and surfacing with sand-clay | 1 | 30,000 |
| Grading, draining, culverting and surfacing with top soil | 3 | 39,750 |
| Grading, draining, culverting and surfacing with bituminous macadam | 2 | 102,000 |
| Grading, draining, culverting and bridging | 1 | 42,000 |
| Grading, draining, culverting and partly surfacing | 4 | 348,000 |
| Improving with gravel surface 15 ft. wide | 2 | 45,000 |
| Relocation and construction | 2 | 45,000 |
| Grading and bridging | 1 | 75,000 |
| Totals | 93* | $6,024,450 |

* Seven projects combine two kinds of surface, or offer them as alternatives. In such cases, half the estimated cost was apportioned to each of the two.

# VERTICAL FIBER BRICK PAVEMENT.

## The Advantages of This Type of Pavement, and Some of the Latest Developments—No Lugs and Bituminous Filler.

The advantages of what is known as "vertical fiber" brick for paving purposes, and some of the latest developments, were set forth in a paper before the American Society for Municipal Improvements on November 13th* by Clark R. Mandigo, consulting engineer to the Western Paving Brick Manufacturers Association.

Beginning with a history of the progress of paving brick construction, through repressing, wire cutting, and the wire-cut lug, Mr. Mandigo explained how experiments had shown that the forcing of the clay through the die in the process of manufacture with an auger machine, formed laminations or fibres approximately parallel to the axis of the machine, or, more exactly, in cone-shaped formation. As the bricks are cut by passing wires through the clay column at right angles to it, the fibres are perpendicular to the wire-cut faces. The following paragraphs are quoted from the paper.

These experiments naturally led to the conclusion, that to give the greatest wear resistance and strongest paving surface, the brick should be laid so that the cones forming the internal structure and the elongated particles of shale should be perpendicular to the pavement surface. The height of the die would then determine the width of the brick, and the spacing of the wires in the wire cutter would determine the depth of wearing surface, the reverse of the case in any other form of paving brick. For want of a better descriptive name, Vertical Fiber Vitrified Paving Brick was chosen to distinguish this form of brick from the others.

All forms of paving brick are piled on edge in the kiln so that the axes of the structural cones mentioned lie in a horizontal plane. The weight of the brick then presses the surfaces of the cones together except on the extreme ends of the brick and makes them more readily fused by heat. An attempt to burn pavers piled the other way in the kiln produced brick so badly laminated as to be worthless. In a certain brick plant in the West, piling on edge did not prevent the cones separating on the ends of the brick where the surfaces were nearly vertical in the kiln, producing brick with weak and laminated ends. Mr. Fuller overcame this by using a die 13½ inches long and cutting off 2½ inches from each side of the clay column before it went to the cutter.

As a result of these investigations, the Vertical Fiber Vitrified Paving Brick was adopted as a standard by the Western Paving Brick Manufacturers Association in 1912. In this type of pavement the brick are laid flat with one wire-cut surface uppermost. The advantage gained by so laying the brick that the internal structural layers are vertical may be slight in a well manufactured brick compared with the importance of the other steps in the process of manufacture, but it represents an additional factor of safety in the pavement and illustrates one of the many technical details the modern paving-brick manufacturer is constantly working out. Moreover, there are many other advantages in this type of brick which make it a desirable form of paver, regardless of its internal structure.

The surface dimensions (4x8½ inches) make as large a unit as can be conveniently handled and, being larger than other forms, reduce the number of joints in the pavement. Vertical fiber brick can be made by any manufacturer with slight changes in his standard equipment. Since the spacing of the wires on the cutter determines the depth of the brick, the depth can be made any dimension desired and vertical fiber brick are actually manufactured in 2½-inch, 3-inch and 4-inch depths, of which the 3-inch depth brick, weighing about 8½ pounds, is the standard.

The depth of wearing surface can, therefore, be proportioned to the class and character of traffic on the street or road to be paved. In all other forms of paving brick, the height of the die determines the depth of the brick and it is not practical, even tho desired, to make a brick less than, say, 3½ inches in depth. It is very difficult to force the clay thru a long narrow die without having torn corners, lack of uniform density and twisting strains in the clay column. In vertical fiber paving brick, the reticulated wire-cut surface is not slick and does not get slimy, but offers a gritty, slightly roughened surface for rubber tires and horses. All surface edges of the brick being square, the joints are of the same width on all four sides thruout the depth. Lugs, if desired, are formed by grooves in the die and, with bulged ends, the width of the joints can be controlled and uniform spacing provided. Thirty-five to thirty-six vertical-fiber brick will lay a square yard, instead of the forty-five required by the standard paving block, making a slight saving in all the items of manufacture, hauling, laying and joint filler. This form of brick is especially adapted to asphalt filler which, under present traffic conditions, is being used with such uniform success thru out the middle West. Lastly, one of the chief advantages in using the vertical-fiber type of paving brick, comes from the fact that tho piled on edge in the kiln, they are laid flat in the pavement, consequently all kiln marks and warps come in the joints and not in the surface of the pavement. The wire-cut surface remains a plane and the brick lay up much more evenly and smoother than is possible where the brick are set on edge.

At the suggestion of the speaker, the Western paving brick manufacturers began two years ago the making of vertical-fiber paving brick without lugs and recommended their use where asphalt filler was specified. This step was taken as the result of some special orders of lugless brick made for streets in Kansas City, Mo., in 1915 and 1916. Lugs on paving brick were invented for use with cement grout filler to give sufficient body to the grout and allow it to penetrate to the bottom of the joint. The joints in any form of block pavement are usually the places where the first signs of wear occur, and the tendency has been to make the joint as narrow as possible. The closer the blocks are set, the more support they lend one another, the less opportunity there is for broken corners and the smoother will be the wearing surface. Narrow joints are especially desirable where asphalt joint filler is used, as the brick will then receive the wear, leaving the filler to perform the functions of waterproofing the surface and providing a thin, adhesive, elastic cushion around each block. As a matter of fact, the slight kiln marks coming in the joints and the manner of laying usually provide more space than is necessary. The lugless brick have been used, therefore, very successfully with cment grout filler, but engineers, as a rule, prefer at least one-eighth inch lugs where grout filler is to be used.

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*Although this issue is dated November 1, owing to the printers' strike it was not actually published until the 15th.

In Wichita, Kansas, lugless vertical-fiber brick with asphalt filler have been laid on the streets for the past several years at an angle of 60 degrees to the curb, practically eliminating wear at the joints and still further improving the smoothness and riding qualities. Other cities are adopting the same method.

A saving of 25 per cent. in the wearing surface over what has been considered the standard depth for brick—4 inches—is well worth making. Examination of the old 4-inch brick pavements, as well as of the 3-inch vertical-fiber brick pavements, leaves no doubt but that the thinner brick surface will be as strong and last as long as the 4-inch brick and at a considerable saving in first cost. As previously mentioned, the 3-inch brick is much the most economical size, costs the least per ton to manufacture, has been designated the standard, and is practically the only size used for streets carrying the heaviest traffic of cities or for country roads and residence streets. Other sizes are made on special order only, at an additional expense. Some cities, like Omaha, Neb., and St. Paul, Minn., are using the standard 3-inch brick set on edge where it is considered that a 4-inch wearing surface is necessary, avoiding specifying special sizes and simplifying pavement construction and repairs.

While this paper is intended as a discussion on vertical-fiber paving brick rather than on vertical-fiber brick pavements, the asphalt joint-filler almost universally used at present with this type of brick has been so interwoven with the success of vertical-fiber brick pavements, that at least a brief mention must be made of it. Four items affecting the pavement have contributed to the success of asphalt filler in brick pavements: (1) the method of application, (2) the shape and texture of the brick, (3) the quality of the filler, and (4) the changed character of traffic. Taking these items up in order, first, the bituminous filler is heated to a temperature below its flash point, is flushed over the surface of the brick pavement and squeegeed back and forth until the joints are full, leaving, necessarily, a slight surplus on the surface. It is impossible to get the joints properly filled by the old method of pouring-cans. No matter how carefully the work was done, there was settlement of joints in hot weather. By flushing the hot asphalt over the brick a saving in labor is effected which more than offsets the slight additional amount of filler used. A coating of sand on the surface of the filled brick absorbs the surplus and, working into the asphalt, makes a good mastic.

In the second place, the wire-cut surface of the vertical-fiber brick which is uppermost in the pavement aids in retaining the thin asphalt mastic on the surface so that it doesn't scale off and cause a dirty street. Without lugs the brick set up close and the square edges give a minimum width, even joint at the surface. The asphalt retained on the surface is only an incident to the proper filling of the joints and is not designed to be maintained. It remains, however, from three to five years and during that time acts as a reservoir for filling joints that settle, so that by the time it has worn off, all joints are packed tight with a solid asphaltic mastic.

In the third place, only the best quality of asphaltic cement is recommended as a filler, as this has proven to be the least susceptible to changes in temperature, possesses a long life, great adhesiveness, elasticity and malleability, and resists wear and rubber-tire suction. A grade of asphalt cement of about the consistency and requirements that would be specified in the best sheet asphalt pavements for an asphaltic base manufactured asphaltic cement has proven very satisfactory. Refined tar has been used in some instances, but does not at present seem to fill all the requirements.

In the fourth place, the preponderance of rubber-tired traffic on the modern pavement has practically eliminated maintenance of joints where soft filler has been used. When asphalt filler began to be used some eight to ten years ago, it was expected that the joints would require refilling on dense traffic streets every five to seven years, but the changed traffic conditions, which have practically eliminated the horse-drawn, steel-tired vehicle and substituted the rubber-tired automobile and truck, have not made this necessary. In fact, the droppings of oil and kneading action of the tires seem to keep the filler alive and prevent any signs of disintegration, or working out of the top of the joints.

The advantages of this type of street or road surfacing may be briefly summarized as follows: (1) The street or road may be opened for traffic as soon as the filler has been applied. (2) Service cuts and openings are easily and simply repaired. (3) It carries the minimum risk in construction, since serious defects do not result thru careless workmanship, lax inspection, or ignorance,—a real advantage in these days of inefficient labor. (4) The steps in construction are simple, all material being tested before being incorporated in the pavement and an opportunity given to correct any mistakes by the following step. (5) The filler is easily manipulated, and not subject to damage by frost, rain or premature traffic. (6) Noise is eliminated. (7) It provides an ideal, non-skid, smooth riding surface for automobiles and gives a good grip for auto tires and horses on all grades. (8) Expansion and contraction are properly and effectively cared for. (9) The elastic filler cushions the brick and the foundation from shock and impact, reducing the thickness of base required and allowing slight readjustments between individual brick under traffic so that each brick remains solidly bedded in the sand cushion,—there is no necessity for a cement-mortar cushion. (10) The wearing surface, being semi-flexible, adjusts itself to slight changes in foundation conditions without damage, and to deflections in less rigid types of bases than concrete.

## PUBLIC ABBATTOIRS.

Speaking before the American Public Health Association on October 30th, John Roberts, of the Bureau of Animal Industry, said that, of more than 1400 municipalities investigated, only 195 had meat inspection of any kind, and in most of these no effort is made to maintain the Government standard.

According to John R. Mohler, chief of the bureau, however, Federal inspection is being maintained at 258 establishments in 230 cities, about 2600 inspectors being employed regularly. Those slaughter houses which sell their entire product within the state are not Federally inspected, and these furnish about one-third of the meat sold in the United States. Dr. Mohler thinks it probable that these slaughter at least 200,000 animals a year that are unfit for use as human food.

A public abattoir, according to Mr. Roberts, "affords the most practical way in which a community can properly protect its citizens against diseased and unwholesome meat, because only at such central places can a thoroughly efficient system of meat inspection be economically carried out." After sifting the reports, it appeared that only 27 cities have municipal or central abattoirs. Sixteen of the 27 are southern cities, Albany, Ga.; Macon, Ga.; Baton Rouge, La.; Winston-Salem, N. C.; Laurens, S. C.; Beaumont, Texas; Taylor, Texas; Paris, Texas; Winchester, Va.; Anniston, Ala.; Atlanta, Ga.; La Grange, Ga.; Columbus, Ga.; Savannah, Ga.; Norfolk, Va.; and Roanoke, Va. Eight are in the northern portion of the country west of the Mississippi —Joplin, Mo.; Devils Lake, N. D.; Grand Forks, N. D.; St. Cloud, Minn.; Yakima, Wash.; Moorfield, Minn.; St. Paul, Minn.; and Lincoln, Neb. Two are in New England —Bridgeport, Conn., and Pittsfield, Mass. The remaining one is Detroit, Mich.

The number of inspectors devoting their whole time to municipal meat inspection is 226, while 182 others are engaged part time. The leading States where inspectors devote their whole time to the work are California, Ohio, Louisiana, Kentucky, New York, and Texas. Salaries average highest in Washington, Oregon, and Louisiana and lowest in Massachusetts and Indiana.

A few only of the cities have a really adequate inspection of meat. Those ranking highest in point of expenditures and number of inspectors engaged are San Francisco, Cleveland, Los Angeles, Oakland, Columbus, Louisville, New Orleans, Denver, and Philadelphia.

## HIGHWAY BRIDGES.

The Department of Public Works of the State of Nebraska, in its October monthly report, gives some general advice concerning highway bridges, as follows:

Highway and Bridge engineers in many of the Western states, following the lead of the railroad companies, have resorted to concrete masonry construction in bridge building, the chief reason being that concrete bridges when properly built, will remain as permanent structures for an indefinite period of time.

In many respects masonry arches are superior to all other forms of bridge structures. They are more stable and last longer because cement hardens with age. As a result the older a concrete bridge is, the stronger it becomes, a condition which is just reversed in steel structures which rapidly deteriorate with age.

Concrete bridges require no painting, floor renewals or other items of maintenance. Such bridges can usually be built largely of materials found in the immediate locality. Arches present a more substantial appearance than can be obtained with any form of truss. But they cannot always be built on yielding soil as the lateral thrust in the foundation is liable to cause serious injury to the structure.

Where the underclearance is not large this difficulty may be overcome by constructing a series of small arches with footings built on pile foundations. In this type the piers greatly restrict the waterway and in rivers having a marked variation in flow or much floating ice or drift some form other than an arch is usually advisable.

Concrete beam bridges, while not as permanent as arches, are extremely durable. Frequent objection has been made to the use of them for the reason that they are not susceptible to artistic treatment. This objection no longer exists and the cause of its withdrawal may readily be seen by examining some of the many beautiful examples.

In making a decision between an arch and a beam design there are several determining factors. Cost is usually the first consideration. This depends largely on the character of the banks and the depth of the stream. It also depends on facilities for obtaning and transporting materials and the availability of skilled laborers. The chief determinant however is the height of the grade above high water. Beam bridges are not suitable for carrying high fills, while arch bridges can be built to support any height of fill. Arches are especially adapted for use in deep ravines, canons, etc. where a high fill must be supported.

Simple slabs are economical for spans under 12 feet, beam bridges supported on stringers or longitudinal beams from 12 to 25 feet and slab bridges with two heavy side beams carrying lighter cross beams supporting the floor slab, 25 to 35 feet.

Beam bridges have been built up to 70 feet in length but they are not generally economical as arch bridges are cheaper.

To determine the economic length of span in an arch bridge of several spans with intermediate piers, a length should be selected such that the cost of one span will approximately equal the cost of a pier.

On very long bridges, where the grade is high above the river bed. the cost of the piers largely determines the cost of the bridge. Under these conditions it is cheaper to build long span steel bridges and to renew them from time to time, since the interest on the difference in first cost would more than offset the cost of an occasional renewal.

## HIGHWAY WORK IN NEBRASKA.

For highway work in Nebraska there has been appropriated for Federal and State aid for the years 1917 to 1921 inclusive $11,732,850. Up to September of this year $296,757 of this had been used, and $149,620 was expended during September, leaving $11,286,473 balance. Of this $7,019,904 is available at the presentime. Assuming three months of winter weather when no work can be done between now and the end of 1920, the state will need to expend, as an average for all the remaining months, nearly five times the September amount, or $585,000 a month.

A state highway system has been laid out that totals 4,500 miles, and project statements have been made to the U. S. Secretary of Agriculture for Federal aid on 2240 miles. On October 1, seven hundred miles had been contracted for at an aggregate cost of $2,500,000, or an average of $3,570 a mile. At this rate of cost, the amount now available would build about 2,000 miles.

## SEWAGE PUMPING IN BUSINESS DISTRICT.

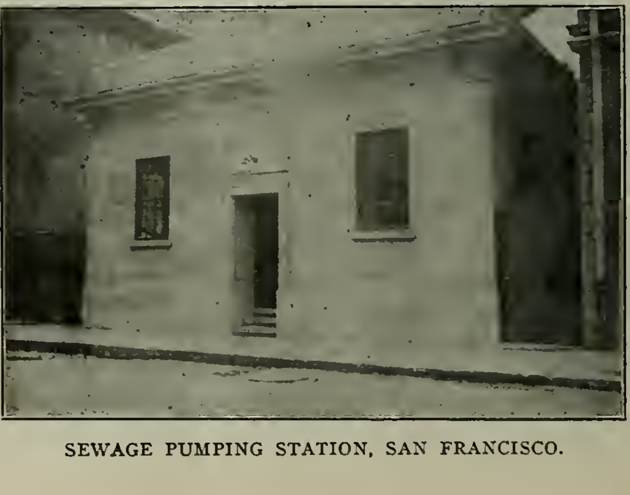
A sewage pumping station is being operated in the business district of San Francisco, which possesses some special features. It is housed in a plain concrete building on Commercial street.

The pumps are of the common type, electrically operated and automatically started and stopped. In connection with the automatic control, there is an electric alarm bell and relay system which gives an alarm at the city corporation yard should the pumps fail to keep the sewage down in the pump well. This is deemed especially desirable because of the damage that would be done to the goods in the basements of the mercantile establishments whose sewage is handled by this station, should the sewage back up because of failure of the pumps to function.

There are two vertical pumps with six-inch suctions, each capable of lifting 650 gallons a minute. In addition, there is a horizontal pump with an eight-inch suction especially designed to handle rags, sticks, etc.

In entering the station, the sewage passes through a bucket screen, which is hoisted and cleaned at intervals.

The gases arising from the sewage are removed by an electrically operated blower, which discharges them into a vent pipe 75 feet high.



SEWAGE PUMPING STATION, SAN FRANCISCO.

# The WEEK'S NEWS

**Texas Counties Break Road Bond Issue Record—New British Transport Ministry Controls Highways—Sacramento's New Filtration Plant—Canton Votes for City Gas Plant—Current Shortage in Seattle—Washington Police Give Up Union—Ohio Governor Suspends Canton Mayor—Census Figures on Municipal Finance Show Big Deficits.**

## ROADS AND PAVEMENTS

### County Road Bond Issues in Texas.

Austin, Tex.—All records for issuing road bonds in the State of Texas were broken during the last fiscal year, which ended Aug. 31, when the total went to the sum of $25,574,050. This is in contrast to a total of $7,716,049 issued during the two fiscal years ending Aug. 31, 1918; an aggregate of $9,751,000 during the two years terminating Aug. 31, 1916, and $7,424,000 during the two years concluding Aug. 31, 1914. During the first seventeen days of September of this year the Attorney General approved road bonds aggregating $2,555,000. During the two years ending Aug. 31, 1914, the larger issues were as follows: McLennan $1,075,000. Bell $830,000, Smith $430,000 and Wharton $300,000. The larger issues of the two years concluding Aug. 31, 1916, were the following: Bell 385,000, Hopkins $400,000, Hunt $400,000. Wharton $275,000, Titus $285,000. Montgomery $325,000, Kaufman $750,000 Henderson $220,00, Harrison $300,000, Hardin $275,00, Fannin $73,000, Collin $750,000, Brazoria $325,000 and Bastrop $160,000. For the two years terminating Aug. 31, 1918, the largest issues were Anderson $110,000, Caldwell $245,000, Cass $230,000, Eastland $180,000, Fannin $350,000, Freestone $350,000, Henderson $300,000, Jefferson $500,000, Milan $200,000, Morris $170,000, Navarro $841,000, Van Zandt $400,000 and Wood $200,000.

### Highways Under New British Transport Ministry.

London, England—During the war the British Government assumed control of inland transportation throughout the United Kingdom. It has now decided to continue this control for two years, and to coordinate in a Ministry of Transport practically the whole of the authority of existing Government departments in relation to such matters. Within this two-year period the Minister of Transport will formulate plans to serve as the basis of a permanent policy to be defined by Parliament. Highways are included within the jurisdiction of the ministry. The importance of the new legislation is such as to warrant an enumeration of its major provisions:

A Ministry of Transport is created under a Minister of the Crown.

To the Minister shall be transferred by Order in Council the powers and duties of any Government department in relation to (1) railways; (2) "light" railways; (3) tramways; (4) canals, waterways, and inland navigation; (5) roads, bridges, and ferries, and vehicles and traffic thereon; and (6) harbors, docks, and piers; with the exception of certain powers—some enumerated in the act and others left to the discretion of the Council—which are to be withheld largely for administrative reasons.

For a period of two years the Minister will continue the existing control over railways, and he may also extend the range of Government control by taking over any other railways, privately owned "light" railways and tramways, or waterways, or any harbor not excluded by the terms of the act.

With respect to these undertakings the minister may give directions as to (1) rates of service, (2) employees' compensation, (3) operation, (4) maintenance of property, (5) additions and betterments to property, (6) coordination of facilities, (7) manufacturing and repairing, and (8) purchase and distribution of stores.

Rates established under the direction of the Minister are to continue in force for 18 months after the expiration of the interim two-year period, unless Parliament should take action to modify them. Existing agreements which the Minister shall deem consistent with the public interest are also to be continued in force for a like period of 18 months.

Owners of undertakings may recover for losses to property or earning capacity due to Government control, while the Government may recover for gains. The Treasury, upon the recommendation of the Minister, may guarantee returns on securities or payments of working expenses of undertakings under control.

The Minister may establish and operate new transportation services, subject to the approval of the Treasury; but in case of projects involving more than a million pounds, an Order in Council is necessary. He may also purchase private rolling stock under authority of an Order in Council, approved in advance by resolution of Parliament.

Provision is made for a rates advisory committee, made up of a chairman and four other members representing the interests of trade, agriculture, transportation, and labor, all nominated by officers within the Government; and for a roads advisory committee, of not less than 11 members, 5 representing highway authorities and 5 representing users of the highways. The Minister is also required to set up a panel of experts and of important persons of commercial experience, nominated by various outside interests, to advise with respect to the extension of Government control and the establishing of new transportation services.

Under date of September 22, three Orders in Council were issued under the new act. One provided that the Ministry of Transport should receive, on September 23, the transfers of the powers set forth in the act, and in a schedule it enumerated certain sections of preexisting statutes under which control is, and will continue to be exercised by the Board of Trade. Another transfers the powers and duties of the Road Board to the Ministry of Transport; while the third sets forth the relation of the new Ministry to the Ministry of Health. Sir Eric Geddes is now Minister of Transport, and among his chief assistants are Sir Alexander Gibb, head of the civil engineering department; Sir John Aspinwall, consultant mechanical engineer; Lieut. Col. L. Simpson, mechanical engineer; Sir George Beharrell, chief of statistics and accounts; Sir Philip Nash, in charge of transportation and traffic; Sir Hardman Levere, in charge of finance; Sir C. Bartolome, in charge of development; Sir Edwin Maybury, in charge of roads; and Sir William Marwood, who will deal with questions of labor. The new Minister has already presented his view as to what is to be accomplished. Competition for traffic is to cease; and the transportation agencies of the country will be brought into working harmony. Economy is to be brought about through the reduction of terminal delay and the elimination of empty haulage. Rolling stock is to be improved and larger cars of standard design are to be introduced. Electrification is to be extended. A special effort will be made to locate new factories in the rural sections, thereby providing better service to the agricultural interests and promoting the welfare of the industrial worker.

## WATER SUPPLY

### Plans for Sacramento's New Filtation Plant.

Sacramento, Cal.—Outlining the engineering plans for the filtration plan, Charles G. Hyde, chief engineer, has announced that the engineering force would cost about $117,000, or 6½ per cent. of the total cost of $1,800,000. The sum voted for the filtration plant, Hyde said, would be sufficient to complete it, in all probability, and he advised the purchase of as large a site as possible to fill any future needs. In addition to himself and George N. Randle, as consulting engineers, the staff will consist of C. P. Gillespie as resident engineer, in charge of the work. H. B. Foster will be hydraulic enginer, George J. Calder will be structural engineer, and an electrical and mechanical engineer is to be secured. There will be an office enginer, with designers, draftsmen, tracers, letterers, clerks and stenographers working under him. The field engineer's force will consist of surveyors, clerks and inspectors. Ordinarily, Hyde said, 8 per cent. is allowed for engineering, but he believes 6½ per cent. will suffice for the work here. Hyde said: "The plans and specifications will be divided into units, such as the levee, the intake tower, the sedimentation basin, the pumping station, the pumping equipment, etc., probably about twelve parts in all. On each of these divisions, contracts will be let, as the plans and specifications are ready. In this way work can be begun on the levee almost at once, while those parts requiring a great amount of time for preliminary work can be taken up later. Eighten months should finish the job this way. But if it is the desire of the Commission to let the work out in one contract, then it will require at least six months to prepare the plans and specifications on which to call for bids, and there will be few bidders. One contract would be extremely intricate, and it would be hard to get competition. It would be of such magnitude that local bidders would be almost excluded."

### Water Supply of Idaho Towns Below Standard.

Boise, Ida.—Water supplies of more than half of the 15 Idaho cities investigated by the state health department during four months recently were found to be "prejudicial to public health." Three of these cities, Idaho Falls, Montpelier and Twin Falls have installed proper purification systems at considerable expense. One of them, Twin Falls, has now the best filtration plant in the state of Idaho. Two others, Harrison and St. Anthony, are, in the words of Dr. E. E. Laubaugh, medical advisor of the department, "contemplating very material changes." Radical laws upon the disposal of sewage which is contaminating Idaho streams and lakes are likely to be asked of the next legislature. Some of the cities already investigated include Pocatello, McCammon, Idaho Falls, Victor, St. Anthonoy, Ashton, Avery, Lewiston, Paris, Montpelier, Emmett, Payette, Moscow, Coeur d'Alene, Twin Falls, Buhl, Jerome and Soda Springs.

## STREET LIGHTING AND POWER

### Vote for Municipal Gas Plant.

Canton, O.—By a vote of 922 to 215, with less than one-third of the electors voting, the $525,000 bond issue for the erection of a municipal artificial gas plant has been approved at a special election. A two-third vote was needed and the ballots in favor of the issue passed this requirement by 187 counts. The bond issue was placed before the voters as the East Ohio Gas Company has announced its intention of cutting off the supply of natural gas November 1. The gas is wholesaled to the Alliance Gas and Power company, which retails it to the city. Negotiations are now under way with the West Virginia Natural Gas company to supply Alliance with gas from its trunk mains which pass through Sebring, four miles east of the city. If this is accomplished, the artificial gas plant will not be erected.

### Municipal Electric Plant Cannot Meet Demand.

Seattle, Wash.—Ordering the cluster street lights dimmed except for one globe only instead of three customarily used, city superintendent of lighting J. D. Ross, has called attention to a serious condition in Seattle. Due to the constantly increasing demand for electric current both for industrial uses and for lighting, superindentent Ross foresees no substantial relief until the new hydro-electric machinery and generator, purchased recently by the Board of Public Works for the Lake Union steam plant, are installed early next summer. Even with the Lake Union plant's output increased there will still be necessity for the economical use of the power available and should a large industrial plant place an order for any great amount of power the city would again be placed in the position it now finds itself. Lighting department engineers state that the natural growth of the city will require all of the power which can be obtained from the present source and the belief is expressed that until the Skagit project is in operation no permanent relief will be had. The output of the Skagit plant when completed will be ample to supply current for three cities the size of Seattle.

## FIRE AND POLICE

### Washington Police Return Union Charter.

Washington, D. C.—The local policemen's organization has returned its charter from the American Federation of labor. The few policemen remaining in the union by a vote of 84 to 21, decided to withdraw from the Federation. The union had more than 600 members a month before, but a great many resigned, being influenced by the developments in Boston and by the determination of members of Congress to withhold pay from policemen affiliated with organized labor. C. A. Strobel, the new president of the union, said that the vote to return the charter was taken to demonstrate that Washington policemen appreciate the action in Congress in recommending an increase in their salaries. Officials said the opposition of district officials to the affiliation of the policemen with organized labor had nothing to do with the vote to return the charter. Several members declared they favored continuing their affiliation with the Federation and desired to leave to the courts the question whether they have a right to affiliate. They were overruled; however. It was said that the present union will continue as a local organization. The members hope eventually to make it the center of a National Association of Policemen. The House of Representatives, by a vote of 222 to 3, passed a bill containing the following provision prohibiting union organization among the police of the capital: "No member of the District of Columbia shall be or become a member of any organization or of an organization affiliated with another organization which holds, claims or exercises the right to demand of any of its memberships obedience to an order to strike or cease work for any cause. Upon sufficient proof to the Commissioners of the District of Columbia that any member of the Metropolitan Police of the District of Columbia has violated the provisions of this section, it shall be the duty of the Commissioners of the District of Columbia to immediately discharge such member from the service."

### Policemen's Pay Increased.

Lynchburg, Va.—Proposed increases in the salaries of policemen have been approved by the finance committee of the city council, and the committee on police and public safety. The new scale of pay is as follows: Chief of police, salary raised from $140 to $155 a month; first sergeant, $115 to $130; second sergeant, $110 to $125 third sergeant, from $105 to $120; fourth sergeant, from $100 to $115; first grade private, from $3.25 to $4 a day; second grade private, from $3.15 to $3.75; third grade private, from $3 to $3.50; turnkey, from $2.50 to $3.

### Fire Apparatus Reserve Plan Installed.

Boston, Mass.—Fire Commissioner Murphy has taken the first step to put into effect a plan for establishing a reserve supply of fire apparatus as a safeguard against conflagrations and to furnish a source upon which to draw for temporary replacements of apparatus withdrawn for repairs. The commissioner designated an old fire house as a reserve supply depot and awarded a contract for rebuilding it for this purpose for $8442. This work is expected to make the building fire-proof and will include a steel and concrete floor. As soon as this job has been finished several pieces of apparatus will be placed in it, including department automobiles now out of active service. This station will be the first one for the reserve apparatus but Mr. Murphy expects to establish several other stations during the next few months. By Jan. 1, 1920, there should be a fairly good supply of apparatus in reserve in three or four stations which should be ready by that time. In addition to the reserve apparatus being housed in this station, when the remodelling work has been finished, it is expected that quarters will be provided for an automobile school for firemen. It is probable that commissioner Murphy will designate certain officers of the department to take charge of the reserve apparatus in case of a conflagration requiring more than the regular active-service apparatus and they will be given a plan on which to work when such a call comes.

## GOVERNMENT AND FINANCE

### Governor Suspends Mayor.

Canton, O.—Governor Cox recently suspended mayor Charles E. Poorman from office for thirty days for alleged inefficiency in handling the steel strike riots here. The governor urged a committee of Canton business men to stand by vice mayor Schrantz in maintaining order and protecting property. The governor assured a delegation of Canton business and professional men, who came to hear the sentence of suspension, that Canton would be protected against disorder, but that the citizens must take a stand for law and order and exhaust their resources before he will act. The delegation wanted troops, but the governor demanded an attempt by Canton itself to restore order. The examination before the governor disclosed that only twenty-five rioters had been arrested; that the city had a very small police force; that citizens had made no attempt to enforce order; that the sheriff deputized no aids, and that municipal court judges dismissed rioters with light fines and suspended prison sentences.

### Census Statistics on Municipal Finance.

Washington, D. C.—In 147 of the 227 American cities of more than 30,000 poulation the excess of expenditures for governmental costs, including interest and outlays for permanent improvements, over revenues during the fiscal year 1918 amounted to $70,923,990, or $3.48 per capita. In the remaining 80 cities the excess of revenues over expenditures was $22,323,060 or $1.60 per capita. Taking the entire 227 expenditures over revenues amounted to $48,600,930, or $1.42 per capita. The net indebtedness of these cities averaged $77.53 per capita. These are among the significant facts presented in a report entitled "Financial Statistics of Cities Having a Population of Over 30,000, 1918," just issued by Director Sam L. Rogers of the Bureau of Census, Department of Commerce. The aggregate population of these 227 cities was estimated at 34,300,000, or nearly 33 per cent. of the total population of the country. Ten cities are estimated to have more than 500,000 inhabitants each; 12, from 300,000 to 500,000; 47, from 100,000 to 300,000; 62, from 50,000 to 100,000, and 96, from 30,000 to 50,000. The aggregate revenues of all the cities during the year were $1,124,094,899; the aggregate expenditures for current expenses and interest, $894,332,392, and the aggregate outlays, $278,363,437. Of the total revenues $790,577,487, or 70 per cent. represents receipts from the various kinds of taxes. The bulk of this amount, $705,723,158, was derived from the "general property tax," made up of taxes on real and personal property. Of the remaining receipts from taxes the largest item, $35,576,383, was derived from taxes on the liquor traffic. This amount is smaller by $1,398,000 than the corresponding sum reported for the fiscal year 1917, although the total number of cities covered by the report is greater by eight in the later years than in the earlier.

Next to taxes the source of the largest item of revenue is found in the earnings of public service enterprises which amounted to $116,494,645. This sum is considerably more than double the amount of payments for expenses of public service enterprise $55,174,480, thus leaving a net revenue from this source of $61,320,165. The bulk of the earnings of public service enterprises came from water supply systems, from which the receipts aggregated $90,139,705.

Another important source of revenue consisted of special assessments and special charges—the bulk of which were for outlays—aggregating $72,673,785. This sum is appreciably smaller than the corresponding amount reported for the preceding year—$83,195,596.

For all the cities taken as a whole the per capita receipts from property taxes amounted to $21.03; from other taxes, $2; from earnings of public service enterprises, $3.39; from special assessments and special charges for outlays, $2.12, and from all other sources combined, $4.20.

The expenditures during the year for governmental costs in these 227 cities, which aggregated $1.172,695,829, were in the order of their importance: For expenses of general departments (legislative, executive and judicial establishments, schools, police and fire departments, sanitation, etc.), $690,160,283; for outlays, $278,363,437; for interest on indebtedness, $148,997,629, and for expenses of public service enterprises (water supply systems, electric light and power system, docks, wharves, landings, etc.), $55,174,480. The amount expended for outlays was somewhat smaller than the corresponding sum for the preceding year, $386,529,990.

The average per capita expenditures for all governmental costs, including interest and outlays, in the 227 cities amounted to $34.16, and for all governmental costs, including interest hut excluding outlays, the average per capita payments were $26.05.

## LEGAL NEWS

A Summary and Notes of Recent Decisions—
Rulings of Interest to Municipalities

### Valid Interpretation of City Ordinance—Fire Prevention Requirements.

(Ala.) Where a city ordinance, like a statute, is susceptible of two interpretations, one of which will nullify, the other sustain, it, the validating interpretation should be given, though the other is the more natural.—Birmingham Ry., Light & Power Co. v. Kyser, 82 So. 151.

### Power of City to Remove Obstruction.

(W.Va.) Regardless of ownership of the fee subject to easement of public street, public authorities may remove obstructions by abutting owner without liability to him where removal is necessary for reasonable public accommodation or to a system of improvements, if power is exercised reasonably and not willfully or arbitrarily.—Jones v. City of Clarksburg, 99 S. E. 484.

### Informal Municipal Consent to Obstruction.

(Pa.) An obstruction in public street does not gain a legal status by inaction of public authorities, as in such case laches will not be imputed to commonwealth or to municipality, but laches may be imputed to a municipality which stands by and permits large expenditures upon faith of an irregular order of court, or of municipal consent informally or tacitly given, where formal consent would have been effective.—City of Pittsburgh v. Pittsburgh & L. E. R. Co., 106 A. 724.

### Recovery of Excessive and Illegal Taxes.

(Kan.) Where excessive and illegal taxes imposed by city of second class are involuntarily paid, they may be recovered by the taxpayer.—Bush v. City of Beloit, 181 P. 615.

### Sloping Street Surface—City Liable for Letting It Be Slippery.

(Mo.App.) A city was liable for maintaining its brick paved street at a crossing in so smooth and slippery a condition that a pedestrian fell.—Berry v. City of Sedalia, 212 S. W. 34.

If injury results to a pedestrian on a crosswalk from a danger inherent in the adopted plan, the city is not liable, but it is if the danger has arisen from negligent construction of maintenance of the plan.—Id. A city was not liable for planning its streets so as to have a proper slope from the crown to the gutters; yet, having constructed a pavement on such slope, in maintaining it the city was under duty, in view of the slope, to see that the surface did not become so smooth and slippery as to render it dangerous to pedestrians.—Id.

### Flooding Due to Street Grade—Dangers from Extraordinary Rainfall.

(Wis.) City held not liable to a property owner for flooding his premises on the ground that by reason of the grading of the streets more water was discharged into a ravine in the block than would have come to it in a state of nature.—Andrus v. City of Ashland, 172 N. W. 721.

In relation to the liability of a city for the flooding of premises by surface water, rainfalls are divided into three classes, ordinary, extraordinary, and unprecedented, and a city is not liable for damage resulting from an extraordinary rainfall.—Id.

# NEWS OF THE SOCIETIES

Feb. 9-13, 1920.—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention, Louisville, Ky. Secretary, E. L. Powers, 150 Nassau street, New York.

## Illuminating Engineering Society.

The thirteenth annual convention of the Illuminating Engineering Society was held at the Hotel Sherman, Chicago, Oct. 20 to 23, about 400 members and guests being in attendance from all over this country and from Canada, England and even Japan. Those present included not only illuminating engineers but also public officials, architects, educators and others interested in lighting more than twenty-five papers were read at the five technical sessions and a number of entertainment features balanced the program.

The convention was opened Monday afternoon by Homer E. Niesz, chairman of the general convention committee. Louis A. Ferguson, vice-president of the Commonwealth Edison Co., delivered the address of welcome. Louis B. Marks, of New York, replied. In his presidential address G. A. Hoadley referred to the last two conventions held under the stress of war and he reviewed in a general way the lessons of the war. The society's Committe on War Service was very active and through various subcommittees, comprising 43 members, it handled a great variety of lighting problems of great importance in the conduct of the war. These included design of lighting of aviation training camps and buildings thereon, lighting of balloon hangars and grounds, lighting of navy gun and machine shops, protective lighting of various grounds and works, lighting of government workmen's cottages, war-time lighting economies, factory lighting, hotel lighting restrictions, lighting of coal mines, metal conservation in reflectors, etc. Dr. Hoadley pointed out prices may be lowered through increase of production and this may be aided by improving the present inefficient lighting system in many factories.

F. E. Cady, Cleveland, chairman of the Committee on Progress, presented a review of the most important developments of the year in the illuminating field. Among the features mentioned was the growing use of tungsten lamps and decrease of carbon filament lamps. Among new units are the 50-watt white Mazda and the 25 and 50-watt mill type Mazda. Some new types of vapor arc lamps are reported, among them another neon lamp. Much headway has been made in searchlights. Electric headlights are being rapidly installed on locomotives and an effort is under way to standardize them. War restrictions on lighting are reviewed in the report, especially as enforced abroad. Many ingenious expedients were resorted to. Numerous new or changed installations of street lighting are referred to. Unique effects have been produced in spectacular illuminations connected with victory celebrations in New York, Chicago, Portland, Ore., etc.

A report of the Committee on Automobile Headlighting Specifications, C. H. Sharp, New York, chairman, was presented by W. F. Little, of New York City. At the instance of this committee a three-day session was held in January of all interested in the automobile headlight problem. The committee drafted a model headlight law which was slightly revised by the Committee on Lighting Legislation. Further consideration was given to the subject of specifications for acceptability tests for headlights. Four test positions were recommended as follows:

Position 1.—Some point between road level and a point on a level with the lamps in the axis of the car—4800 cp.

Position 2.—In the axis of the car 60 in. above the roadway at 100 ft.—2400 cp.

Position 3.—60 in. above the roadway, 7 ft. to the left of the axis of the car at 100 ft.—800 cp.

Position 4.—At 100 ft. at some point between road level and a point on a level with the lamps and 7 ft. to the right of the axis of the car—1200 cp.

At the suggestion of the authorities in Connecticut these new specifications were offered. Within the past month the authorities in Pennsylvania have requested the committee for specifications to be used in that state. It was suggested that each device manufactured and sold must be accompanied with adequate instructions as to installation. Both Connecticut and Pennsylvania have established an inspector system in which their inspectors use a foot-candle meter.

The discussion was opened by J. R. Cravath, Chicago, who pointed out that positions 1 and 4 give minimum requirements. He said that inspector system should be a valuable means of improving the headlight situation and that the use of test stations in connection with garages or oil-filling stations may prove desirable. L. C. Porter, Harrison, N. J., spoke of the desirability of uniform laws in the different states. He commended a pamphlet published by the Motor Vehicle Department of California in instructing the public on this matter. The difficulties in making lamps uniform were described and he said that some flexibility in the specifications is therefore necessary. H. H. Murphy, Portland, said that Oregon is trying to make regulations similar to those of California. He believes that the public is anxious to meet any requirements that solve the problem properly. To secure uniform legislation it may be necessary to have Federal legislation. J. A. Hoeveler, Madison, spoke of the new law in Wisconsin which holds that headlights not in accord therewith are prima facie evidence of the unsafe use of highways. C. O. Bond, Philadelphia, said it was possible to use road signs as convenient test stations. Mr Little closed the discussion by explaining the inspector system used in Connecticut. Motorcycles are used and when a driver is held up for the first time the headlight situation is explained to him in considerable detail. In Pennsylvania inspectors are to be trained for similar service. He thought that it would be desirable to have an expert adjust the head lamps in all cases.

On Tuesday morning three papers dealing with street lighting were presented, the first being by C. A. B. Halvorson, West Lynn, Mass., and A. B. Oday, Harrison, N. J., and entitled "Street Lighting with Low Mounted Units—Kensico Dam Roadway." The roadway on top of the dam is 2200 ft. long and 26 ft. wide with a 4-ft. sidewalk on one side and a stone parapet wall 4 ft. high forming the border. This dam is of imposing architectural design and it was desired to illuminate the roadway along its top without use of the ordinary lighting standards. After considerable study it was decided to use lighting units imbedded in cast-iron boxes placed in the parapet wall. This involved special designs for these boxes, for mounting of the lamps, reflectors and a baffle to cut off the direct light of the lamps, which were 6-volt, 108-watt, Mazda C units. The lamps were staggered on opposite sides of the wall and give quite a uniform and pleasing illumination of the entire roadway. The installation is unique in this respect and has been found entirely satisfactory.

The second paper, entitled "Recent Developments in Street-Lighting Units (Electric)," by A. D. Cameron, Schenectady, N. Y., and C. A. B. Halvorson, was read by the former and supplemented by illustrations described by Mr. Halvorson. In pendent units for series Mazda lamps an important addition is the combination of dome refractors and stippled or rippled outer globes. These have some advantage over the use of the refractor alone, on account of appearance and making it easier to clean the single outer surface. A new form of bowl refractor is being brought out with a closed diffusing base. In ornamental units the tendency is strongly toward single units of high candlepower instead of clusters and the standards are being made more slender and unobtrusive. An installation is being made in Saratoga, N. Y., of duplex units in which within the single outer globe there are two lamps superimposed. The lower lamp is 600 or 1000 cp. and is expected to burn until midnight, whereas the upper lamp is 100 or 200 cp. and by means of a simple cutout replaces the lower lamp after midnight, thus reducing the operating cost from then on. In parkway and residential lighting there is no need for having upward light as in case of white way lighting. Hence, the use of dome refractors and suitable globes is becoming more com-

*(Continued on page 274).*

# NEW APPLIANCES

**Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.**

## BROCKWAY HIGHWAY TRUCK.

### With Divided Body to Save Handling and Measuring Materials.

The common practice in highway construction of dumping materials at the roadside and then transporting them in wheelbarrows and measuring them into the concrete mixer involves a variety of wastes. Material is wasted in dumping and handling and time is wasted in handling and rehandling.

These possibilities of loss are said to be eliminated by the new Brockway motor truck particularly designed for highway work. The body itself is of the "all-purpose" or "utility" type, with the sides and tail gate removable so that it can be used as a flat platform body. The tail gate is also arranged so it can be swung from the top or bottom. The special feature of this body is in the arrangement of the division boards. These are spaced to hold a certain measured quantity of stone or sand, or stone and sand mixed, the spacing of these boards depending upon the size of the concrete mixer. These boards are hinged at the top and held in position by three plungers that are operated by a hand lever placed outside of the body.

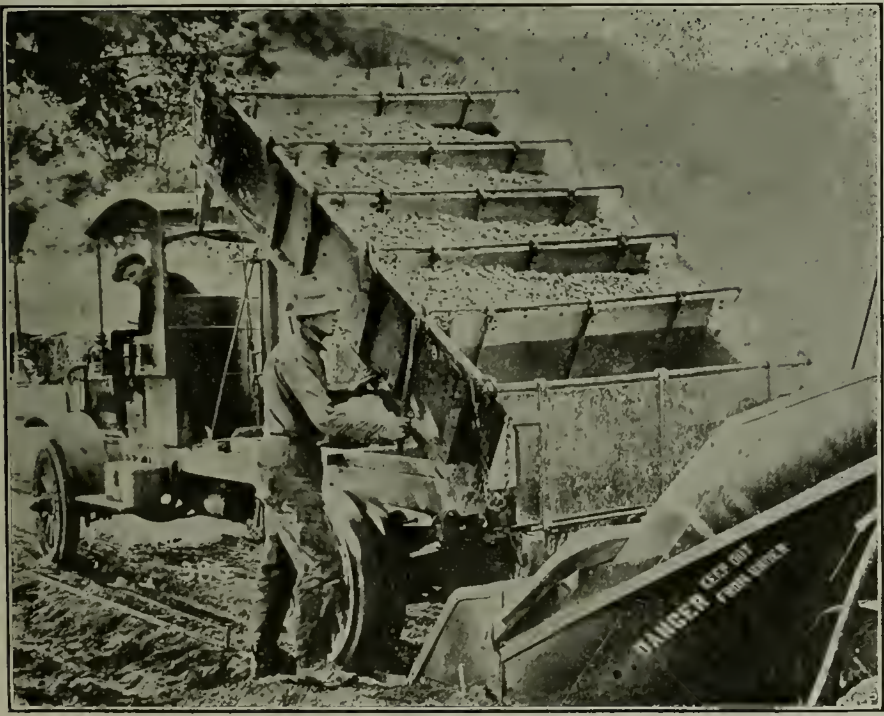
In operation the truck is run under the bin and the material dumped in by use of a chute. On reaching the concrete mixer, the truck is backed up to the skip as shown in the photograph, and the body hoisted, the tail gate is opened and the rear compartment, which holds one charge for the mixer, dumped into the skip. After the skip returns to position, the other compartments are emptied, one at a time, merely by pulling the lever at the side. When the truck is emptied, the body is lowered and the boards swing back into position. These division boards are all easily removable so that truck can be used for other work.

The use of this body does away with the need of wheel-barrows at the mixer, and in that way saves one handling. When hauling sand and stone mixed, the only material that has to be handled at the mixer is the cement. Another advantage is that there is no cleaning up to be done as the work progresses, as is necessary where material is dumped on the road side.

An advantage is also claimed over the industrial railway, as no tracks are needed, and the contractor has the truck for such other work as may be necessary.

**It is claimed that in actual opera**tion on highways it has been found that this body not only saves the cost of a number of men at the loading end of the mixer, but speeds up the spreading gang as there is absolutely no time lost in charging the mixer.

The truck is made by the Brockway Motor Truck Company, Cortland, N. Y.



HIGHWAY TRUCK WITH DIVIDED BODY.

## INDUSTRIAL NEWS

The Four Wheel Drive Auto Company, Clintonville, Wis., manufacturers of the F.W.D. truck, in order to handle increased business, has made an addition to its plant, of two buildings, comprising 35,196 square feet of floor space. A large quantity of new machinery has been ordered and is rapidly being installed.

Work on the new Canadian plant is progressing rapidly and soon the Clintonville plant will be relieved of all Canadian business.

The Four Wheel Drive Company reports domestic business strong with export demand unusually heavy.

### "National Motor Truck Development Tour."

Organized as a National Motor Truck Development Tour, a fleet of 20 trucks and 80 men recently completed, at Milwaukee, a 60 day tour through Illinois, Iowa, North and South Dakota, Minnesota and Wisconsin over a route 3,000 miles long, to prove to the country the efficiency of the motor truck.

All trucks ranging from one to two and one-half tons in capacity were on pneumatic tires. Rain, mud and sand provided conditions that enabled the caravan to make a record performance under adverse circumstances. There were only nine punctures on the entire tour, each truck covering close to 5,000 miles, including the extra mileage in demonstration hauls.

A United States band of 25 pieces under command of Lieut. F. M. Willson, U. S. N., from the Great Lakes Naval Training Station was a part of the expedition, the jackies riding on the trucks the entire distance. They gave concerts in the 80 towns and cities through which the party passed. Major E. M. Lubeck and Captain C. H. Mitchell of the war department at Washington were on the trip to observe the performance of pneumatic tires.

A. R. Kroh of the truck tire sales department, Goodyear Tire and Rubber Co., Akron, Ohio, was in charge of the caravan and delivered the addresses at open air meetings where farmers gathered to hear the band, inspect the trucks and see the demonstrations.

M. D. Scott, Goodyear expert on truck transportation, was in charge of the trucks and brought them through without an accident.

Over 10,000 feet of motion picture film was taken of the truck train as it journeyed over the prairies of the middle west states. These pictures will be shown this winter before 2,600 agricultural societies.

The tour was purely an educational venture and was the first effort of the National Association of Motor Truck Sales Managers who organized recently with membership in 65 truck companies.

### Infringement Charged by Goodyear Tire and Rubber Co.

The Federal Trade Commission at Washington has just issued a citation requiring the men behind the Chicago company styling themselves as the "Good Wear Tire and Tube Company" to appear before that commission and explain the reason for that name and, if possible, to show cause why they should not be required to desist from using that name in violation of the law.

According to the Goodyear Tire and Rubber Company's statement " in the citation it is brought out that this Chicago firm engages in the business of buying up second-hand or used automobile tires and then attempting, by cementing two of such used tires together and otherwise treating them, to produce a tire for sale. In the disposition of this inferior product it has been the practice of these people to advertise by catalogues, circulars, and otherwise, in an attempt to lead the public to believe that such tires are new and unused. They have also by the use of the name adopted for their firm, attempted to use the reputation acquired by The Goodyear Tire and Rubber Company in the marketing of these spurious tires. It is pointed out that the name adopted so nearly resembles and simulates the name of Goodyear as to lead the public to believe, that they are getting Goodyear products and the advantage that comes from the years of work spent in perfecting a high-quality product known all over the world, and using its high reputation in an attempt to fool the tire-buying public.

"The Federal Trade Commission also finds that this spurious company has simulated even the style of advertising used by the Goodyear company for many years, in its campaign of misrepresentation."

## NEWS OF THE SOCIETIES

(*Continued from page 272*).

mon. A new type of one-piece molded porcelain unit is being developed which includes a radial wave reflector and refractor holder. For luminous arc lamps electrodes are now being made under pressures of 500 tons per inch, which give 30 to 40% more light than the standard electrode and an increased life of from 30 to 40%. It is also expected to use glass mirror reflectors with these lamps to still further improve their efficiency. This should make it possible to use rippled outer globes in place of the clear globes now so common. The increased efficiency of the electrodes also permits the use of a lower wattage adjustment on each lamp, thus saving 40 watts per lamp and increasing the capacity of the rectifier. In Detroit 90 to 94 lamps are now operated on each 75-light rectifier. The paper closes with a warning that the very simplicity and flexibility of the Mazda lamp, which has made it so popular in street lighting, tends toward neglect of proper cleaning and maintenance.

F. V. Westermaier, Philadelphia read a paper entitled "Recent Developments in Gas Street Lighting." It was pointed out that the police value of street lighting is its greatest importance to the public, and municipalities usually look to this protective value rather than to the illumination secured. Although this should be a municipal concern, the matter is left largely to the utilities furnishing the lighting service. Street-lighting rates are usually on a unit price contract basis and the specifications are rather infrequently changed. A constant tendency is toward cutting down expense. Taking up gas street lighting particularly, the author showed that this is usually separated into supply of the fixtures and operation and maintenance. He described several new types of multiple mantle lamps and high-pressure lamps. The latter, although considerably used abroad, have found little application in America due to the expense of separate mains and the low revenue derived from street lighting alone.

Dr. L. Bell, Boston, in opening the discussion, showed that both the Mazada and the luminous arc are keeping on developing although it was predicted that one of these would gain ascendency. Both have distinctive fields of their own, that of the luminous lamp being for high-intensity lighting. This lamp has also increased the efficiency considerably and, moreover, has the advantage that it must be cleaned regularly, whereas incandescent units are so commonly neglected. F. R. Mistersky, Detroit, said that in that city the use of the newer magnetite electrode enabled the city to add 1100 new lamps to the former 7000 without adding to the capacity of the station. Ward Harrison, Cleveland, said it is necessary to impress on the authorities that cleaning must be done regularly, regardless of the type of lamp used, and efforts should be made to make cleaning easier. It has ben found that the absorption of light by the globes is negligible as compared with that due to dirt. H. B. Vincent, Philadelphia, emphasized the need for discarding lamps that had been blackened from long use just as is the practice in interior lighting. J. W. Cowles, Boston, dwelt on the value of sparkle in street-lighting units. One objection formerly raised to incandescent units was that they lacked this, but this is now taken care of by the new ripple glass which gives the unit life and animation. Cleaning cannot be laid down in a definite schedule applicable to all streets since it depends on the amount of traffic and dirt.

C. A. B. Halvorson declared that the lighting of the Kensico dam has been found very satisfactory and it meets all requirements. He would not recommend it for universal application because the presence of crowds on sidewalks would obviously shut off the light and mud and dirt spattered by passing traffic would also obstruct the light. In the particular installation neither of these conditions existed.

"Glare Measurements" by Ward Harrison, Cleveland, was opening paper on Wednesday morning. This gave the results of tests made with a considerable number of observers viewing an opening illuminated by a lamp until this opening became objectionably glaring. One of the most important findings indicated is that the total light flux that reaches the eye from a source is the most important single factor in the production of glare. The discussion was opened by J. R. Cravath, Chicago, who said that there have been three kinds of glare tests, the first being test of eye fatigue after long exposure; the second, interference with vision, and the third, momentary or snap judgment tests.

Industrial lighting and codes regulating its practice were discussed during the rest of the session. The afternoon session was devoted to commercial possibilities, the first address being by R. M. Searle, Rochester, N. Y., on "Opportunities for Extending Lighting Through New Applications." He called attention to the opportunity for bringing up the lighting of side streets to approximately the standard of main streets so as to reduce the danger of accidents from automobiles. Highway lighting is only in its infancy and presents wide opportunities for electric lighting companies. Large possibilities lie in floodlighting of monuments, playgrounds, etc. Many other fields for lighting business development were pointed out, and Mr. Searle said that perhaps less than 25% of the lighting possibilities have as yet been developed. Discussion was opened by L. Friedman, Chicago, who called attention to the timeliness of promoting highway lighting. F. W. Willcox, London, England, made an address on "Lighting in England."

### Vacancies for Technical Men.

There are vacancies for high grade technical men capable of acting as secretary or in the technical positions in the department of public works, the department of public buildings on the department of public affairs of Buffalo, N. Y., after Jan. 1, 1920. College graduates with municipal experience desired. Those interested should write, giving data as to education, training, salary and reference, to Frank C. Perkins, president, Central Council, Business Men's Association, 655 Prospect ave., Buffalo, N. Y., who has been elected councilman.

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## PROGRESS IN ROAD PAVING.

In connection with the papers, reports and discussions on paving at the New Orleans convention of the American Society for Municipal Improvements, two facts seem to have a certain significance—first, no new ideas were presented for pavement surfacing, except perhaps some minor details, and no changes were adopted to the standard specifications of the society for pavements; second, four of the papers out of the eight read on the subject of paving gave prominence to the idea that under some conditions cement concrete base for pavement was less desirable than macadam or bituminous concrete.

A third idea that was emphasized by most of the speakers was that, in spite of all that has been said and written on the subject, the soil foundations of pavements still receive far less attention than their importance demands, and less is known about them and how to treat them than is known concerning the various wearing surfaces. We expect to discuss this at some length in a week or two.

## PREPARE ROADS FOR WINTER.

Some roads wear out, others weather out. And for most roads in northern climates the most destructive weathering occurs in winter and during the subsequent thawing. Much of the injurious effect can be prevented by precautions taken now, such as removing all ruts from the road surface, immediate completion of all drainage work under way, removing weeds and other obstructions from side ditches, drain outlets and culverts, sealing the surface of bituminous pavements where this has become rough or porous, etc.

For the northern half of the United States this preparation against freezing weather should be begun at once, if it is not already under way, and completed as quickly as possible. Once frost has penetrated an inch or two into the ground, little can be done to prevent its destructive effects continuing until the ground has dried out in the spring.

## PREPARING FOR 1920 ROAD WORK.

The urgent desirability of letting 1920 road contracts as soon as possible was presented in this column of the October 25th issue. Within the past week two state highway departments have announced that they are taking what steps are possible toward enabling contractors to ship material and prepare forces for 1920 road work.

S. E. Bradt, superintendent of highways, under date of November 15th, announced that he hoped to award contracts for about 1000 miles of roads in addition to the uncompleted contracts of this season; and, to relieve the open-top car situation, will pay for such materials as sand, gravel and stones as delivered, without waiting for them to be incorporated into the work, vouchers being issued to the railroads for freight as well as to the producers for the materials, the amounts to be deducted next year from the contractors' estimates. This is to insure obtaining the materials and avoiding car congestion, as explained in the October 25th issue.

Charles M. Upham, chief engineer of the Delaware State Highway Department, made public, by a circular letter dated November 18th, a tentative list of roads that probably would be improved by the state in 1920. This information was sent to contractors "in order that it may give you an opportunity to look over the roads, locate your materials, and do anything necessary to prepare yourselves for submitting proposals." He expects to advertise the contracts early in 1920.

These states are really doing something which should tell in the degree to which they will be able to carry out their 1920 programs.

## STANDPIPE PAINTING DATA.

In our November 1st issue we published a paper discussing the painting of standpipes, in which reference was made to data bearing on the subject which had been collected by the author and had been tabulated by him and would be published in this issue of Municipal Journal and Public Works. Owing to conditions caused by the still-continuing strike of the printers there has been delay in setting up this table and it is not ready for this issue, but we hope to be able to publish it in that of November 15th.

# AMERICAN SOCIETY FOR MUNICIPAL IMPROVEMENT CONVENTION

## Narrative of the Doings of the Society at the New Orleans Convention—Reports of Secretary, Treasurer, and Committees—Papers and Discussions—Exhibits—No Changes in Specifications

Owing to the omission of the convention in 1917, the completion of the 25th year since the organization of the A. S. M. I. coincides with the holding of the 25th convention. The society is recovering rapidly from the effects of the war, as is demonstrated by an increase this year of more than 50 per cent in the attendance at the convention over that in 1918 at Buffalo, the latter being the first held after the interim caused by the war. It is further shown by the increase in membership. The Secretary's report showed a loss in membership to October 1, 1919 of one, but the executive committee's report showed a net increase in membership from that date until the opening of the Convention of 26, and there was an additional increase during the Convention of 17 so that the membership now amounts to 585 individuals.

The distance of New Orleans from the center of the membership caused the absence of many of the older members, the proportion being indicated by the fact that there were seven past presidents in attendance as compared with the usual ten to fifteen, most of those present living in the south. There were many new faces and their interest in the proceedings gave good promise of the future welfare of the society.

Notwithstanding the diminished income and the greater proportional expense due to war and post-war conditions, resulting in a deficit in the year's operations, the increased interest in all lines of the society's activities is increasing its income, the effect of which is now becoming evident.

The program was followed as printed, with one or two exceptions and the treatment of the two sessions of each day as though they were one.

### TUESDAY'S SESSION.

Following the address of welcome, the response, and the President's address, the Executive Committee, Secretary and Treasurer presented their reports. These showed that there had been admitted during the year 66 active members, 10 affiliated and 20 associate; while there had been lost 66 active, 4 affiliated and 27 associate. The membership on September 30th was 424 active, 22 affiliated and 96 associate—a total of 542.

The membership dues received totaled $1622 from active members, $82.50 from affiliated, and $777.50 from associate. Receipts from sale of Proceedings were $179, from advertisements in Proceedings, $422.52, and from sale of specifications, $64.15. The total receipts for the year were $3286.07 plus $86.10 interest on Liberty bonds owned by the society. The expenditures included $212.50 for printing and stationery, $600 for clerical, $300 salary of secretary: postage and express, $184.37; printing Proceedings, $1662.46; printing specifications, $90; Convention expenses, $675.35. Some miscellaneous expenses brought the total to $3848.74.

The treasurer's report showed the above in detail; also that the cash balance at the beginning of the fiscal year was $728.81, and on October 11, 1919 was $252.24. In addition the society owns $1500 of the third issue of Liberty bonds.

The report of the Finance Committee was submitted on Friday morning.

Three excellent reports were presented on Tuesday afternoon, which were good reviews of progress and present tendencies: One by A. Prescott Folwell on public markets; one by N. S. Sprague on municipal legislation and finance, and one by A. Chaussé on fire prevention.

The smoker given by the local committee on Tuesday evening gave a good opportunity for the members to become acquainted, and, although it was posted as being "a la Sahara Desert," it was a Sahara in but one respect.

The Society regretted that they could not become acquainted with T. L. Willis, the city engineer in charge of convention arrangements, who has been the subject of hospital attention for some months. Also it appropriately expressed its sorrow for the death of Captain W. J. Hardee, elected third vice-president last year.

### WEDNESDAY SESSIONS.

The sessions of Wednesday were devoted particularly to sewerage and sanitation, including the New Orleans systems, described by Geo. G. Earl; the functions and duties of state and provincial health authorities and their cooperation, by F. A. Dallyn; sewage treatment and utilization by Raymond Wells, dealing especially with economic values of sludge; Geo. T. Hammond on the Brooklyn sewage treatment experiments; E. S. Dorr on the acid process of sewage treatment; the sewage disposal methods of the Emergency Fleet Corporation, by C. P. Collins (read by Mr. Hammond in Mr. Collins' absence); army camp utility operation, by Maj. W. L. Benham, and street cleaning and snow removal by Geo. H. Norton. There were also interesting papers on Water Supply and Sanitation Systems in St. Nazaire camp, France, by Maj. J. B. Hawley and in Camps Meade and McClellan by Morris Knowles and J. M. Rice.

A very prominent, pleasing and instructive feature of the evening program was the lecture of W. D' A. Ryan, director of the Schenectady Illuminating Engineering Laboratory, on "Illuminations, Ancient and Modern, with special Reference to Decorative Street Lighting," illustrated with many handsomely colored stereopticon slides illustrating the development of the art of illumination and its application to decorative lighting and artistic street illumination. The practical application of the development was made in a specially satisfactory manner. It was introduced by a brief report from C. W. Koiner, Chairman of the street lighting committee.

### THURSDAY SESSIONS.

Thursday programs were confined almost exclusively to pavement and road discussions and the latest problems were discussed in papers very much to the point and showing thorough familiarity with them.

Recent developments in concrete highway construction were described by A. N. Johnson. Bituminous pavements had full attention in papers on mineral aggregates for them by W. L. Caldwell, bases for them by Geo. C. Warren, maintenance of them and of macadam pavements, including the use of bituminous materials therein, as practiced in France under war conditions, by Maj. E. A. Kingsley. Brick pavements were covered by papers on economy in brick street and road construction by W. P. Blair, on vertical fiber brick pavements by C. R. Mandigo and on brick and block for street paving by S. C. Corson.

The discussion of pavement foundations was quite full in the papers by Johnson, Warren and Blair and presented some valuable material for consideration in connection with this important problem, which is apparently the next important problem in pavement and road construction to receive special consideration, and has always been the most important and usually the most neglected problem.

Very few changes in standard specifications were offered and none were passed to letter ballot by the members. Quite a number of brief changes in details of construction were offered for the stone block specifications, likewise for the cement concrete specifications, and the new committee on specifications for sidewalks, curbs and gutters presented full specifications. These were all referred back to the respective committees for further consideration and report at the next convention and will be printed in the volume of Proceeding of the 1919 convention.

The subjects of National highways and public works were ably discussed by S. M. Williams, chairman of the Highway Industries Association and Federal Highway Council, and W. B. Gregory, consulting engineer, of Tulane University, New Orleans, and the convention passed a resolution that "whereas several bills have been introduced in the Congress of the United States providing for the construction of a Federal Highway system, the American Society for Municipal Improvements in convention assembled most heartily expresses its endorsement of the construction of such a system of highways."

### FRIDAY SESSION.

Friday morning, as well as a part of Wednesday evening, were largely ocupied by a series of papers on city planning and construction, with special emphasis on adornment and convenience and adaptation to the topography.

They were introduced by a brief report by Nelson P. Lewis, chairman of the committee, covering their general principles, and included a paper by Thomas Adams on the planning of land in relation to social problems, one by Nelson Cunliff on architectural design and construction in St. Louis parks, and one by Knowles, Rice and Rose on the Loveland Farms development at Youngstown, O. The arguments in Mr. Adams's paper are practically exemplified by his references to the regional development oposite Detroit, which was described in detail in a paper presented to the Society last year. Methods of designing such developments are given in the paper on Loveland Farms.

The report on uniform traffic laws and classification of highways by Maj. R. K. Compton, and the paper on highway traffic by F. A. Reimer, should be considered especially by those interested in the design of highway systems, as they contain the latest on these important subjects, and take definite steps toward more thorough and intelligent study of matters not yet fully understood.

### EXHIBITS.

The number of exhibitors was much greater than usual and the pleasing manner of decoration used with the character of the exhibits gave a very satisfactory effect to the eye and seemed to be more than usually satisfactory to both exhibitors and members. The list of exhibitors included the following:

American City, New York. Asphalt Association, New York. Barber Asphalt Paving Co., Philadelphia. Barrett Co., New York. Birmingham Slag Co., Birmingham, Ala.. Bitoslag Paving Co., New York. Brandeis Machinery & Supply Co., Louisville, Ky. and Memphis, Tenn. Carson Petroleum Co., Chicago. Cement Products Co., Wilmington, N. C. Creosoted Materials Co., New Orleans, Cudlipp Belting & Machinery Co., New Orleans. Dunn Wire-Cut-Lug Brick Co., Conneaut, O. Engineering News-Record, New York. Ferguson Segment Block Co., St. Louis. Granite Paving Block Manufacturers' Association, Boston. Harry Brothers Co. of Louisiana, New Orleans. Ideal Power Lawn Mower Co., Lansing, Mich Jennison-Wright Co., Toledo, O. Kinney Manufacturing Co., Boston. Manufacturers' Record, Baltimore, Md. Municipal Journal & Public Works, New York. National Paving Brick Manufacturers Association, Cleveland. Monroe L. Patzig, Des Moines, Iowa. Pittsburg Testing Laboratory, Birmingham. H. H. Robertson Co., Pittsburg. St. Louis Convention Bureau. Sinclair Motor Co., New Orleans. Southern Construction News, Little Rock. Standard Oil Co. of Indiana, Chicago. Standard Oil Co. of Louisiana, Asphalt Sales Dept., New Orleans. Standard Oil Co. of New York. Texas Co., Asphalt Sales Dept., New York. Isaac Ventrump, Chicago. Warren Bros. Co. Boston. R. D. Wood Co., Philadelphia.

As usual in the election of officers, the first vice president as moved up one step, Geo. H. Norton, city engineer of Buffalo, becoming president.

Maj. R. Keith Compton, chief engineer of Baltimore Paving Commission, first vice-president.

E. S. Rankin, engineer of sewers, Newark, N. J. second vice-president.

W. W. Horner, Chief Engineer of Sewers and Paving, St. Louis, Mo., third vice-president.

Charles Carroll Brown, Prof. Civil Engineering, Valparaiso, Ind. Secretary.

Fred J. Cellarius, consulting engineer, Dayton, O. treasurer.

F. A. Reimer, county engineer, Newark, N. J. (Chairman), L. D. Cutcheon, secretary of Dept. of Public Works, Grand Rapids, Mich., and F. A. Dallyn, Provincial Sanitary Engineer, Toronto, Ont. finance committee.

St. Louis was chosen as the next place of meeting.

The local committee, in spite of the absence of its head, showed itself fully equal to the occasion and members and their ladies were outspoken in their approval of the arrangements as carried out.

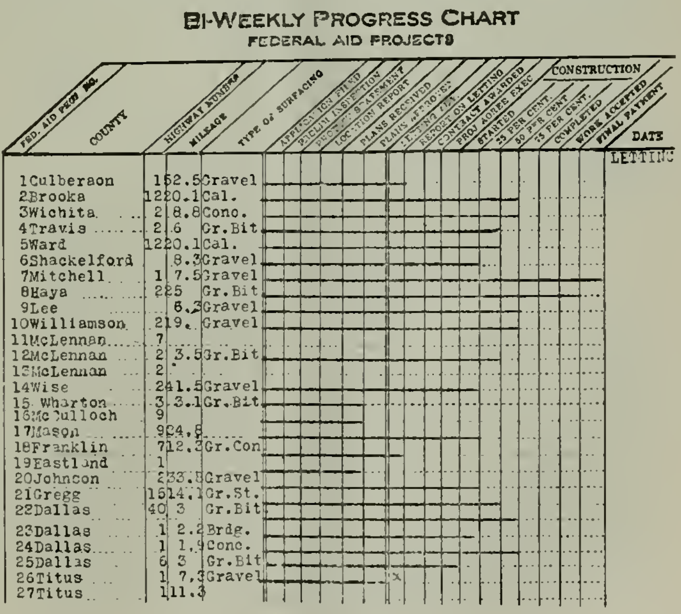
## TEXAS PRORESS CHART.

In the March 29th issue we described a method of giving information concerning the progress being made week by week in the construction of state highways in Texas, a code letter having been devised by state highway engineer George A. Duren for this purpose. A key was published for interpreting the letter.

Mr. Duren's successor, Rollen J. Windrow, has substituted for the weekly code letter a bi-weekly progress chart, a reduced copy of part of which is shown herewith. This can be read at a glance without the use of a key. On the other hand, it requires four large sheets instead of two or three inches on a single sheet.

The chart contains records for 117 Federal aid projects and 98 state aid. The first five columns give the project number, county, highway number, mileage, and type of surfacing, these remaining unchanged. As the several steps toward completion are taken, a heavy line is drawn opposite the road across the columns representing these steps. Until the stage has been reached of application for a project number, a road is not placed on the list.

Supplementing the chart is a general summary of all projects; also data regarding new projects added since the previous issue, and an announcement of lettings to be held. The letter of October 25th stated that 9 Federal aid pro-


BI-WEEKLY PROGRESS CHART
FEDERAL AID PROJECTS

| FED. AID PROJ NO. | COUNTY | HIGHWAY NUMBER | MILEAGE | TYPE OF SURFACING |
|---|---|---|---|---|
| 1 | Culberaon | 1 | 52.5 | Gravel |
| 2 | Brooka | 12 | 20.1 | Cal. |
| 3 | Wichita | 2 | 8.8 | Cono. |
| 4 | Travis | 2 | .6 | Gr.Bit |
| 5 | Ward | 12 | 20.1 | Cal. |
| 6 | Shackelford | | 8.3 | Gravel |
| 7 | Mitchell | 1 | 7.5 | Gravel |
| 8 | Haya | 2 | 25 | Gr.Bit |
| 9 | Lee | | 6.3 | Gravel |
| 10 | Williamson | 2 | 19. | Gravel |
| 11 | McLennan | 7 | | |
| 12 | McLennan | 2 | 3.5 | Gr.Bit |
| 13 | McLennan | 2 | | |
| 14 | Wise | 2 | 41.5 | Gravel |
| 15 | Wharton | 3 | 3.1 | Gr.Bit |
| 16 | McCulloch | 9 | | |
| 17 | Mason | 9 | 24.8 | |
| 18 | Franklin | 7 | 12.3 | Gr.Con |
| 19 | Eastland | 1 | | |
| 20 | Johnson | 2 | 33.8 | Gravel |
| 21 | Gregg | 15 | 14.1 | Gr.St. |
| 22 | Dallas | 40 | 3 | Gr.Bit |
| 23 | Dallas | 1 | 2.2 | Brdg. |
| 24 | Dallas | 1 | 1.9 | Conc. |
| 25 | Dallas | 6 | 3 | Gr.Bit |
| 26 | Titus | 1 | 7.3 | Gravel |
| 27 | Titus | 1 | 11.3 | |

PART OF TEXAS PROGRESS CHART.

jects had been completed, totaling 110.8 miles, and 22 State aid projects, totaling 223.7 miles. The abbreviation are defined as follows:

Sand and Clay, Snd. Cl.; Caliche, Cal.; Clay and Caliche, C & C.; Mud Shell, Ms. Bit.; Iron Ore, Iron O.; Gravel, Grav.; Gravel and Bituminous, Gr. Bit.; Gravel and Concrete, Gr. Conc.; Gravel and Mcadam, Gr. Mca.; Concrete, Conc.; Concrete Bituminous, Conc. Bit.; Asphalt, Asph.

# ECONOMIC VALUES IN SEWAGE SLUDGE.

## No Net Returns Probable Unless Ammonia Exceeds Three Per Cent—Decreasing—Market Value of Products.

A comprehensive paper entitled "Economic Value in Sewage and Sewage Sludge "was presented before the American Society for Municipal Improvements on November 12th by Raymond Wells, chemist and technologist of Homer, N. Y. The author presented some ideas and figures as to values different from those commonly found in such articles, and discribed at some length an experiment in treating the sludge as garbage is treated by the Cobwell process. The paper, somewhat condensed, is given below.

Partial elimination of moisture by filterpressing or centrifuging, followed by drying, would seem to be the simplest method of putting sludge into a valuable form. But unfortunately the almost colloidal character of the precipitate and the amount of grease and metallic soaps contained, render pressing and centrifuging below 75-80% of moisture a difficult task. The subsequent evaporation of so great an amount of water in any type of dryer is most expensive and odors given off are extremely disagreeable. Furthermore, in direct-heat dryers, the volume of gases of combustion together with the moisture-saturated air is so great as to preclude any thought of condensing or scrubbing out the odors. For this reason alone, aside from the difficulties encountered in drying such a material, it is difficult to see any hope of solution in this direction.

Furthermore, the dried residue or tankage obtained by this method, while having considerable manurial value, is in a most undesirable condition for use as fertilizer or fertilizer-base goods. This is due to the grease contained which, when it exceeds 80% in any tankage, renders its assimilation by the soil extremely difficult. To really complete the cycle of operation, the dried sludge should be percolated, grease removed and the percolated tankage redried. Since, however, a large percentage of the grease present is in combination with alkaline earth and heavy metals in form of metallic soaps, solution by simple percolation is impossible, but the sludge must first be acidulated with some mineral acid. (Sulphuric acid is the only one that is low priced enough for this purpose.) This will render the fatty acids soluble; but at high temperature any trace of mineral acid would render the fatty materials valueless. Also the acidulation would be expensive and troublesome. For these reasons, the operation of drying, percolating, redrying, etc., so readily applied to other materials, seems not to be very successful when used in sewage sludge.

Destructive distillation of the dried or semi-dried sludge has been attempted, with the usual methods of recovery of the ammoniacal liquors and oils. Here again the problem of moisture elimination is intruded and the recoveries made are not such as warrant the hope of even paying for the operation, much less of showing any profitable return. In both the cases of distillation of dried sludge and of garbage tankage, the experiments of the writer have in all cases failed to show a greater recovery of nitrogen in the ammoniacal liquor than 35-40% of that present in the original samples. As a rule an additional 30% remains in the retort charcoal, with the residue passing off as nitrogen in the combustible gases. The oils passing over are of little value except as fuel. This appeals to the writer as a very expensive way of producing fuel oil.

Acidulation of semi-dried sludge from filter-presses or centrifuges, followed by drying in retorts, with subsequent distillation in current of superheated steam, to carry over the fatty acids liberated by acid, has ben tried, but found unsatisfactory for many reasons.

Methods have been described and tested out on a large scale, attempting the direct extraction of greases from wet sludge by volatile solvents. In these processes, which are difficult and expensive to carry out, a partial solution of the free grease results, together with a portion of the waxes existent in sewage, and of soaps. The result is the formation of extremely resistant emulsions, which seems to defy any recovery treatment by distillation. After such an emulsified mass has reached a certain concentration in the solvent recovery stills, the whole charge expands into a foamy mass in which seemingly a gallon will fill a large tank.

An endless number of methods and schemes have been tried first and last, but apparently none had sufficient merit to survive the first attempts. Possibly many failed under market conditions which do not exist at the present time, or what is more likely, at their beginning they promised so much that mere partial success gave nothing but discouragement.

### INHERENT VALUES OF SLUDGE

The value of sludge will be governed by its grease and nitrogen content, since, while all sludges contain small percentages of bone phosphate and potash, from a practical standpoint they may be neglected.

Consider the following analyses (dry basis):

| | Ammonia | Grease |
|---|---|---|
| Baltimore sludge, acid process, fresh | 3.26% | 27.23% |
| Boston sludge, acid process, fresh | 3:91% | 29.30% |
| Chicago Sanitary Dist. activated, fresh | 5.10% | 14.70% |
| Pleasantville, N. Y. settling basins, one month in basin | 4.14% | 27.40% |
| Syracuse, settling basin, fresh | 4.02% | 9.60% |
| Syracuse, activated, fresh | 5.06% | 17.70% |

All of the analyses are from samples of sludge produced from comparatively fresh sewage and are representative of sludge rapidly deposited, and not allowed to rest in the tanks for any great length of time. For that reason little bacterial action had taken place and the ammonia and grease content are at their maximum for the different types of sludge.

Compare with these, analyses of samples of sludge from so-called septic tanks or sludge which has been exposed for a great length of time on drying beds:

| | Ammonia | Grease |
|---|---|---|
| Baltimore sludge from tanks, on bed approximately six months | 2.24% | 1.50% |
| Chicago activated, nine months old | 4.40% | 5.00% |
| Akron, O., three months in tank, six months on bed | 1.00% | 6.00% |

All other things being equal, the value of a sludge for by-product recovery purposes depends upon the shortest possible period of tanking and shortest elapsed time between tank and ultimate utilization. In other words, bacterial action and weather erosion must be restricted to a minimum. This is directly contrary to usual sewage practice and is one of the rocks on which the disposal proposition has stumbled.

Below a certain minimum of recoverable values, there is no use attempting recovery. This minimum seems to be, for low-grade ammoniates such as garbage tankage and sewage sludge, approximately 3% ammonia. Below this, the expense of handling and freight cost put it out of all hope of competition with other and more concentrated materials. From an economic and business standpoint, any goods falling below this rating had better be forgotten and no time wasted on developing methods of handling.

Moisture content of sludge leaving tanks is the next most vital consideration. In order to come within economic range of any method of artificial drying of any material containing 3 to 3.5%ammonia and 10 to 15% grease on dry basis, moisture must not exceed 75 to 80%. All sludges as they come from tanks or basins are far above this and activated sludge way beyond. Sludge from ordinary sedimentation basins can be drained and air-dried within several weeks to 77 to 80% moisture and by centrifuging to about the same amount. It would appear, however, that the simplest and most inexpensive method is that of depositing sludge, after removal from tanks, on drainage beds exposed to atmospheric drying conditions. In any case, without the presence of water-dumping facilities, the sledge must be partially dewatered before final disposition.

With sludge containing 75% moisture, the ultimate disposition with by-product recovery is not impossible, tho difficult and presenting many curious conditions.

### THE COBWELL PROCESS

To accomplish the disposal with production of a marketable tankage and grease, the elimination of all of the moisture with subsequent extraction of the grease by volatile solvents by a system of drying, extraction and recovery in one operation is suggested. Such a combined and complete operation is carried out at the present time only by the Cobwell process.

This process, as is doubtless well known, is applied to handling of municipal garbage, dead animals, slaughter-house offal and other wet organic waste materials. At the request of several engineers and municipal officials a number of small-scale and several large-scale experiments have been undertaken and carried out on sewage sludge, with results which seem to warrant some hope of solution of the problem.

It is unnecessary to go into any detail in description of a process with which most engineers are familiar. But some variations are required in applying it to handling of sewage sludge.

In this method of dehydration with simultaneous degreasing, the principle employed is that of dessication in a hot bath of an immiscible solvent, which shall serve not only as a dehydrating medium but shall also during the period of drying continually dissolve the grease contained in the material to be dried. Such a solvent preferably employed in the handling of sewage sludge, is a high-boiling petroleum naphtha, distilling within the range 360-F.-420F., which corresponds to the first 60-70% over in the fractionation of "Standard Waterwhite Kerosene." This material serves not only as the most economical heating medium but, owing to the high temperature maintained in the dessicating mass, serves to remove or dissolve the metallic soaps as well as the free grease. Cold or merely warm solvents of a less oily nature have little solvent action on such soaps, but high-boiling oils, particularly when carrying small quantities of grease, are able to dissolve them without difficulty. Upon cooling they are apt to be deposited as jelly-like masses or to cause the gelatinization of the whole solvent solution, and for that reason the solution must be treated before entering recovery stills, in such a manner that the soaps are decomposed and a solution of clean, fatty acids results. This treatment will be taken up in order.

[The author here described the apparatus, which description is omitted.]

The entire cycle of operations takes place in a closed circuit and the only vent for non-condesible gases for the whole system of tanks (or reducers), condensers, separating tanks, washers, stills and storage tanks, is on the final solvent storage tank or tanks. This vent in turn exhausts thru an oil scrubber to recover traces of naphtha carried over by carburetting. During no period of the operation is the sludge exposed to the air or manhandled in any way, until it is finally discharged from the side door of the tank in a dried, degreased condition. The only places where odors or noxious effluent are exposed to the air and liable to cause an insanitary and nuisance condition, are at the gas vents on the storage tanks and at the effluent overflow on the separating tank. This effluent is of course water distilled from the sludge and carries with it the odor of the sludge, which in the case of fresh sludge and that preferably handled, is very offensive. The quantity of this water is of course equal to that contained in the sludge prior to dessication and the condensed steam from the steaming out of the solvent from the drained sludge, prior to dumping from machine. This approximates a ton of effluent for every ton of sludge handled. The only way found by the writer to effect deodorization of this effluent and of rendering it harmless, is by the addition of chlorinated lime or chlorine water. The greatest amount necessary for deodorizing very foul water is one part of 35% available chlorine bleaching powder to 3000 parts effluent. The non-condensible gases leaving the storage-tank vents must be scrubbed with chlorinated lime solution before allowed to pass to atmosphere.

With these precautions, it is safe to say that the entire operation of dessication and degreasing, or the whole recovery operation, can be carried out with no offense to public welfare and sanitation.

In handling sewage sludge by this method, no difficulties have arisen, other than those usually met with in handling wet organic materials of other sorts, and since in sludge the moisture is present in free condition, mechanically combined, the period required for dessication is much shorter than that met with in the treatment of garbage and animal refuse, in which the majority of the water is more or less chemically combined. For this reason only four or five hours are required in drying a given amount of sludge compared with at least twice that for the same amount of garbage.

Experiments and trial runs indicate the capacity of each tank as eight tons in twenty-four hours and in a plant handling the sludge from a town of 200,000 inhabitants (approximately 40 tons 75% moisture basis daily), the cost for handling, including overhead and fixed charges, will approach $6 to $6.50 per ton of green sludge. This cost will not be greatly changed in handling sludge containing 75% or 50% moisture, but since the gross tonnage to be handled would be greatly reduced, the plant investment would be greatly reduced and the by-product returns per green ton much greater. If by any method of dewatering on beds or other inexpensive method, the moisture can be reduced below 75%, by just so much will the success of a recovery plant pass from just self-maintenance to a possible profit.

After carrying out such an operation, what possible yield of by-products may be expected and what is their character and what their value? This depends entirely on the nature of the sewage handled. It has been presupposed that any sludge running less than 3% of ammonia on a dry tankage basis is not worth handling, unless indeed the grease content is very high, in which case it is possible that the grease alone might pay for recovery. From an average of a number of analyses, however, it would seem as if a sludge low in ammonia is also low in grease, so that a 3% ammonia tankage would indicate a 15-25% grease content on a dry basis. For these reasons, in handling a 75% moisture sludge, a yield of 430 pounds of tankage and 75 pounds of grease may be expected.

### MARKET VALUE OF PRODUCTS.

What is the nature of this grease and tankage; have they any market value? This is not a matter to be dismissed off-hand. At the present time, if either or both of these products were thrown on the market, emphatically they would not find a purchaser, or certainly the price would be absurdly low. Consider the nature of these by-products as indicated by their analyses:

**Analyses of Greases From Different Types of Sludge**

| | Free Fatty Acid | Unsap. | Neutral | Moisture |
|---|---|---|---|---|
| Baltimore (acidulated) | 77.48% | 11.78% | ....... | 10.74% |
| Chicago (activated) | 48.80% | 24.40% | 19.1% | 7.70% |
| Syracuse (sedimentation) | 51.50% | 19.30% | 18.70% | 10.50% |
| Pleasantville, N. Y. (sed.) | 75.70% | 19.80% | 4.50% | ....... |

Boston Moon Island (sedimentation)
Free fatty acid (as oleic) ... 48.40%
Free fatty acid (by weight) .. 40.19%
Rosin acids (in fatty acid)* .. 14.36%
Fatty acids (by difference) .. 25.83%
Unsaponifiable .............. 21.09%
Neutral grease (by weight) ... 20.00% (molecular weight of neutral fatty acids 272)
Metallic soaps and solid imps. ............ 3.30%

The first four analyses are of grease recovered in the process outlined and it will be noticed that in the first three, large quantities of solid impurities and moisture are recorded. All grease of sewage-sludge origin on leaving stills contains large amounts of such impurities, since, due to the emulsifying action of the waxes present in the so-called unsaponifiable, it is very difficult to obtain clean greases without subsequent washing with acid and settling. The fourth analysis is of a grease after such treatment.

These analyses are of several different types of sludge and sewage treatment, yet all present the following general characteristics:

The saponifiable matter in each case consists for the most part of free fatty acids and a very small portion of neutral grease or combined glycerides. This is, of course, anticipated by the fact that the greater part of the grease present in sewage sludge comes from hydrolysed soap solutions, or thru the action of bacteria and ferments neutral grease has been broken down into fatty acids and glycerine. In any event, the neutral grease present gives no hope of glycerine recovery, so at once the so-called grease falls into the grade of poor-class fatty-acid stock. Of the total fatty acids present, varying in a number of analyses, from 1 to 15% of the total consists of rosin acids. These again are from the soap solutions.

The unsaponifiable matter varies between 10% and 30%, but a majority of samples analyzed show an average of 20%. As may be supposed, the lowest percentages are found in strictly domestic sewages, where they are traceable to body waxes and products of physiological action. In mixed sewage from manufacturing towns the unsaponifiable is highest, as it is made up of mineral oils thrown out from different factories, mills, etc.

Small percentages of metallic soaps of calcium, iron, aluminum and magnesium are present, but upon proper treatment are broken down into fatty acids and mineral salts, washed out as sulphates or chlorides, dependent on the sort of acid used for refining.

From these premises it is necessary to conclude that sewage grease can be regarded only as a very low-grade fatty-acid stock containing 70-75% of fatty acids and 25-30% of unsaponifiable. These fatty acids, depending on the sewage from which they are extracted, will vary in color from a dark ruby red to a black tarry looking mass. In consistency the variation is between a soft buttery mass and a hard and solid cake. This is quite readily explained, the former is very high in fluid-mineral and industrial-refuse oils, the latter from domestic sewage in which the high-melting-point fatty acids have been hydrolysed and precipitated from the soap liquors, whereas the oleic-acid soaps or oleic acid present in mixed soaps remain in solution and pass off with the effluent.

Fatty acids of this type have no legitimate market at this time. Such materials are only valuable as they are refined and made into marketable products. A purchaser of sewage grease would expect by his own efforts to give it all of the value it might ultimately have and, having created something out of nothing, would care to pay little for the raw material. That sewage grease in refined or manufactured form has value is not to be questioned. Such a grease as that indicated in analyses as Pleasantville sludge grease, upon distillation in the manner usually employed for fatty acids, gave the following yields:

| | |
|---|---|
| Light colored distillate | 85% |
| Still returns | 6% |
| Stearine pitch | 6% |
| Loss | 3% |

The distillate was orange yellow in color and of high titre and upon pressing gave 50% of good-colored stearic acid of titre 53.3C. and 50% of red oil containing 38.25% unsaponifiable. Upon pressing, all unsaponifiable matter passes out of seeded or crystalline cake in the red oil, leaving good stearic acid behind. This red oil is marketable for grease compounding and as wool oil. In other words, sewage grease must be manufactured to have value. Once its value is established, a market will be automatically created for the raw grease.

Upon whom shall the burden of carrying out these operations fall? Shall each sewage plant carry out the whole work from sewage to finished product? Shall a number of sewage plants pool their sludge, or their raw grease and tankage and finish at a central plant, or shall a number of plants interest directly a corporation or individual able to carry out the refining operation? At this point sewage sludge ceases to be a problem for the scientist and becomes a purely business proposition.

Returning to the question of disposition of the tankage, it would require considerable propaganda to place upon the fertilizer-goods market a low-grade 3% ammoniate, cursed with the name sewage sludge, tho in the old days of poudrette and natural guano it had an enhanced value in the public mind far greater than its chemical value indicated. The great diluent of sewage tankage is insoluble ash or mineral matter, running from 40-70%with 60% as an average. It is not impossible to concentrate this, tho methods are not yet complete for doing so. A number of experiments conducted by the University of California indicate that, for percentage of nitrogen contained, degreased sludge has higher plant food value than that in dried blood or high-grade tankage.

Even with reasonable markets for the tankage and grease, it is a question whether it is possible to recover enough materials to defray the cost of the operation. In the opinion of the writer and from experience in the garbage reduction business, it does not seem impossible, tho there would be little margin of profit left. But the sludge would be disposed of, its disposition paid for and a large amount of needed materials returned to active use to assist in helping out the world's supply of chemicals and greases. The individual city would receive no monetary return probably, but to virtually create actual concrete products of economic value, to pay for the creation and at the same time solve a troublesome disposition problem is something well worthy of consideration.

With ordinary sedimentation of suspended solids, it is not at all unreasonable to expect from the sewage of a town of 150,000 people daily recoveries of five tons of tankage and one ton of grease. There are many towns of this size. Any city of this class which can return to a useful cycle $50,000 worth of needed materials annually, should consider well the disposition of its sludge pile.

Solving the problem of sludge disposition is not impossible, it is difficult. No chemist, engineer, business man or politician can solve it alone. That co-operation which has not existed must first be accomplished, before any hope of solution is arrived at.

## REFUSE DUMPING AT OAKLAND.

As described in our issue of April 26th, Oakland, Cal., disposes of its refuse by dumping it along the water front to a height of eight or ten feet above high water and covering it with sand. The sand is supplied by an electrically operated dredge which pumps the sand from the bay and delivers it onto the dump. One of the illustrations shows the top of the dump, partly covered with sand.

About sixty loads of refuse a day are brought to this dump, and the drivers of the wagons are required to thoroughly wash them with sea water each trip, immediately after dumping the load. For this purpose a wooden tank at an elevation of about 20 feet is kept filled with sea water

WASHING REFUSE WAGON WITH SEA WATER.

OAKLAND REFUSE DUMP.

by an electrically operated pump. A hose receives water from the tank and is used for washing the wagons thoroughly in every part. It is believed that sea water is more effective than fresh in preventing the wagons from attracting flies.

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## WIRE ROPES IN CONTRACT WORK.

### Suggestions for Prolonging Their Life and Avoiding Accidents—Making Socket and Clamp Joints.

The selection and method of using wire rope employed on derricks and for other purposes by contractors has a great deal to do with determining the life of the rope and the avoidance of accidents due to its failure. A recently published bulletin of the Bureau of Mines gives some excellent suggestions on these points, many of which, although intended especially for mine work, are equally pertinent for contract work.

New rope, when used in lengths of 500 feet or less, should have a factor of safety of at least eight, such factor being applied to the breaking strength of the rope as guaranteed by the manufacturers. When this factor becomes less than 6.4, the rope should be discarded where lives depend on it, although in other cases the factor may be allowed to reach 4.

Soft steel rope is more flexible and is less affected by corrosion from acid water, while those made of hard-drawn steel or plough steel weigh less for a given strength and resist abrasion better. The former is therefore preferable where it is to be wound on small drums or passed through small sheaves, while the later is better where not so wound and for use in hauling where the rope drags along the ground. Flexibility is also secured by making the rope of a large number of small wires instead of a smaller number of larger wires; but the latter is preferable where the rope is subjected to severe external wear. For drag ropes or others constantly drawn over the ground, a rope composed of six strands of seven wires each, laid around a hemp core to give flexibility, is generally used. External wear is also reduced by using "lang-lay" rope, if such rope can be so used as to prevent it from untwisting. In this make of rope a considerable length of each wire comes in contact with the sheaves, with the ground or with wires of another strand, and thus wear on the outside of the rope is distributed and nicking of the inside wires is greatly reduced.

The length of rope should be sufficient to permit cutting off the end and re-socketing six times or more and to allow at least two laps of the rope around the drum when drawn out to its fullest extent.

The drum on which the rope is wound should be large for wire rope, the greater the diameter the better. The diameter of sheaves should be from 66 to 100 times the diameter of the rope. The hoisting drum should be so set that the angle made by the rope with the axis of the drum will at no time depart more than 1½ degrees from a right angle; otherwise the rope is apt to climb upon that already on the drum or crush against it, or rub against the side of the grooves of a grooved drum. Usually it is advisable to make the drum long enough to carry all the rope in one layer in order to lessen the wear and crushing of the rope.

Wire rope should be stored in a dry place, but not subjected to sufficient heat to destroy the hemp core. If stored outdoors, it should be raised off the ground and well protected from weather. In uncoiling rope from a reel, the reel should be mounted on a horizontal support so that it can revolve; the rope must never be pulled over the flage of the reel when laid on its side. After mounting in place but before actual service, a slight pull should be put on the rope and it should be allowed to twist until it attains its natural position.

The rope may be attached to a load by means of a socket, or it may be bent back on itself to form an eye, the loose end being clamped to the rope with clips or clamps. Properly done, the former method develops the full strength of the rope, but poor workmanship is conceled and shows only when the rope slips or breaks in the socket. The fastening cannot be readily inspected, the rope is rigidly held in the socket and the effect of bending is concentrated just above the socket, and the attachment is much more difficult to make. On the other hand, the other method develops at most only about 85 per cent. of the strength of the rope and usually not more than 80, it bruises and crushes the rope where the clips are applied, and the fastening is more likely to slip; but the attachment can be inspected readily at all times and requires little skill in making.

The method of making the socket joint is described as follows: "The rope should be securely seized or bound at the end with soft iron wire before the end of the rope is cut square. An additional seizing should be placed on the rope a distance equal to the length of the socket from the end. After the rope is trimmed off, the seizing on the end of the rope should be taken off, the rope opened down to the second seizing, the hemp center cut out and the wires broomed out. That is, they should all be untwisted but not straightened. Then the wires should be thoroughly cleaned in benzine, naphtha, or gasoline, as far as they are to be inserted in the socket, and then dipped in commercial muriatic acid for 30 to 60 seconds until the acid has cleaned each wire. Next, the rope end should be dipped in boiling water, to which a small amount of soda has been added to clean off and neutralize the acid. Then the rope end is inserted in the socket and warmed, if the temperature is below 65° F., to prevent cooling the zinc too rapidly. The socket is placed with its axis vertical and coinciding with the axis of the rope, the bottom is sealed with clay or putty, and molten zinc or spelter, heated to a temperature that will just char wood, is poured into the socket until it is full. The socket should preferably be forged from one piece of soft iron, without welds.

The clamped attachment is made as follows: The rope is bent back over a thimble of the proper size and the loose end clamped against the long end of the rope with the proper number of clips. The Crosby type of U-bolt-and-drop-forging clip has proved most satisfactory. The clips should be spaced a distance equal to six times the diameter of the rope apart, the drop forging being against the long end and the U-bolt against the loose end of the rope. The number of clips required to develop approximately 80 per cent. efficiency of the rope and the proper length of wrench to tighten the bolts are given in the table.

Number of Crosby-type Rope clips required to Develop 80 per cent of Strength of 6-19 Plow-steel rope.

| Diameter of rope. Inches. | Number of clips | Length of wrench to tighten bolts. Inches. | Efficiency. Per cent. |
|---|---|---|---|
| ¾ | 5 | 18 | 77.39 |
| ⅞ | 5 | 18 | 79.13 |
| 1 | 5 | 24 | 77.89 |
| 1⅛ | 5 | 24 | 80.00 |
| 1¼ | 6 | 24 | 82.15 |

The clips must be carefully inspected each day and tightened if they show any signs of loosening through the stretching of the rope."

The fastening should be cut off and renewed if even a single broken wire is found at that point. Even if no broken wires are found, the rope should be cut off and the fastening renewed periodically, as this is the weakest part of the rope and that most liable to suffer from bending and vibrating stresses. Where a socket joint is used, it is recommended that the time between re-socketing should vary from one month where the average length of actual service is six months, to four months where the average length of service is from 24 to 36 months.

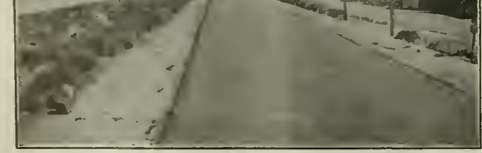
At intervals, say before beginning each season's work, a rope should be examined as to its condition. Besides a careful examination of the outside, a piece should be cut off of each end and unlaid and the inside wires examined for corrosion and wear. If they are found broken or badly worn another piece should be cut off and examined, and if a considerable length is found in bad condition the rope should probably be discarded altogether, or used only for purposes where the breaking would not endanger life or result in serious damage to the work.

A hoisting rope should be thoroughly lubricated, using oils or greases that will penetrate between the wires and the strands and will not harden on the outside. Lubricant that hardens will be cracked when the rope bends over sheaves or drum and will permit moisture to penetrate to the center and cause internal corrosion. Tar should not be used for this purpose, for it forms a hard shield on the outside of the rope and does not penetrate and lubricate the interior. If possible, the rope should be lubricated when dry so as to give the lubricant a better opportunity to penetrate the core and adhere to the wires. The lubricant should be applied often enough to keep the wires well covered and the hemp core from drying out. Before lubricating, all accumulated dirt and gummed lubricant should be cleaned from the valleys between the strands of the rope. This cleaning can be done with a wire brush or with a special device that permits a number of jets of compressed air to play on the rope. The lubricant may be poured on or applied with a brush, but the most thorough and economical method is to use a special device by which the lubricant is applied to all sides of the rope and the excess wiped off. This device consists of a box or trough (the former for vertical and the latter for horizontal ropes) that can be clamped around the rope and allow the rope to be drawn through it, a wiper on the upper end of the box wiping off the excess and the box being kept filled with the lubricant.

Ropes should be inspected every day by the foreman or other competent man, noting the wear of the wires, the stretching of the rope, any broken wires, etc. Special attention should be paid to the rope just above the socket at the clamps, where the rope rests on a sheave, and where it leaves the drum at each end of the hoist.

## ROAD SITE BUILT UP BY GRASS.

San Francisco began on May 13 of this year the paving of a road known as the "Great Highway." This is a boulevard along the Pacific Ocean from the Cliff House to Sloat Boulevard and is one of the city's most picturesque and most traveled highways. The stretch paved is 2.8 miles long and contains about 56,000 square yards. It was completed in a little less than 70 working days. The cost, $85,000, was paid out of the good roads fund, which is derived from state automobile licenses.



UPPER ROADWAY, AND GRASS WHICH CAUSED THE BUILDING UP.
Lower roadway is seen at right.

At the northern end, the construction is of concrete base with an asphalt surface, costing $1.71 a square yard. The remainder of the road consists of two inches of asphaltic concrete on top of the old roadway, which was first scarified,, the holes filled in, and rolled. The cost of this, including the scarifying, was 71.1 cents per square yard.

This road is paralleled by another road, which is used for business and local traffic, while the one above referred to is a motor promenade and sits higher than the other. A few years ago both roads were at the same level; but John McClaren, superintendent of Golden Gate Park, planted along the shore a variety of beach grass which tends to build up the ground by catching and holding shifting sand, and this effected the raising of the ground level ten or twelve feet. It is on this higher ground that the roadway just completed was located. The illustration shows the new and the lower roadway; also the grass that caused the raising of the road site, which grass grows upward as the ground level rises.

## WATER FILTRATION IN THE TROPICS.

By S. W. TAY.

Sanitary Engineer, Territorial Board of Health, Hawaii.

There is very little information on record of the performances of filtration plants in the tropics. The following is a compilation of the records of a slow-sand filtration plant belonging to the Hawaiian Commercial and Sugar Co., located on the island of Maui, one of the Hawaiian Islands.

The above mentioned plantation in 1915 constructed a filtration plant consisting of settling basin, four filter beds and necessary regulating devices to supply a population of some 6000 persons. The filter beds are 60 by 62 feet. The thickness of sand layer is 3 feet, with one foot of graded rock and gravel beneath. The depth of water on the filters is four feet.

The mechanical analysis of the sand used on the filters is as follows:

| | |
|---|---|
| Effective size, 10 % less than | 0.30 |
| 60 % less than | 0.56 |
| Uniformity Coefficient | 1.87 |

| The chemical analysis is as follows: | | % |
|---|---|---|
| Iron | $Fe_2O_3$ | 0.65 |
| Alumina | $Al_2O_3$ | |
| Lime | $CaO$ | 57.16 |
| Silica | $SiO_2$ | 0.39 |
| Magnesia | $MgO$ | 5.20 |

The sand used was the best that could be obtained on the island and was adopted after testing it out for three months in a small experimental filter ten feet in diameter. The rate of filtration is 3,000,000 gallons daily per acre.

The following is a summary of the monthly efficiency of the plant for the year ending June 3th 1919:

| Month | Bacterial Count | | Eff. | Turbidy | | Eff. | Color | | Eff. |
|---|---|---|---|---|---|---|---|---|---|
| 1918 | Raw | Filt. | % | Raw | Filt. | % | Raw | Filt. | % |
| July | 374 | 13 | 97 | 58 | 14 | 76 | 126 | 82 | 35 |
| Aug. | 860 | 55 | 94 | 60 | 11 | 82 | 95 | 55 | 42 |
| Sept. | 1051 | 20 | 98 | 31 | 7 | 77 | 64 | 33 | 48 |
| Oct. | 1624 | 60 | 96 | 33 | 8 | 76 | 69 | 35 | 49 |
| Nov. | 1620 | 59 | 96 | 43 | 11 | 74 | 80 | 45 | 44 |
| Dec. | 2360 | 85 | 96 | 128 | 24 | 81 | 194 | 114 | 41 |
| Jan. | 888 | 24 | 97 | 41 | 11 | 73 | 81 | 43 | 47 |
| Feb.March | 886 | 24 | 97 | 55 | 13 | 76 | 120 | 63 | 47 |
| April | 713 | 26 | 96 | 33 | 8 | 76 | 74 | — | — |
| May | 1070 | 32 | 97 | 29 | 9 | 69 | 62 | 37 | 40 |
| June | 1033 | 25 | 98 | 26 | 7 | 73 | 53 | 26 | 51 |
| Mean | 1134.5 | 38.4 | 96.6 | 48.8 | 11.2 | 77.0 | 92.3 | 53.2 | 42.4 |

The bacterial efficiency for the year was 96.6 %

Reduction in Turbidity was 77.0 %.

The color reduction was 42.4 %

The raw water, which is highly colored and has great turbidity, is the only available supply and comes from the plantation's main irrigation ditch. This ditch is thirty miles long and receives the wash from a large area of cultivated land. The high color is due to the growth of rank vegetation at the point of collection. The use of chemicals has not been attempted in reducing color and turbidity.

Since the filters have been in operation, typhoid fever has been practically done away with on the plantation. Formerly there were one or more cases every month.

## LEGAL NEWS

### A Summary and Notes of Recent Decision—Rulings of Interest to Municipalities

**City Need Not Provide for Bicycles in Streets.**

(Utah) A municipality is not bound in the care and construction of its streets to make special provision for bicycles.—Emelle v. Salt Lake City, 181 P. 266.

**Liability of City for Injury on Icy Walk.**

(Conn.) Where a city failed for several days to clear a much-used walk in the business district of snow, although some of the tenants of property abutting removed part of the snow, the city was negligent and is liable for injuries suffered by a traveler who slipped on the ice formed by melting snow.—Lucy v. City of Norwich, 106 A. 762.

**Pedestrian Must Attend to Lawful Incumbrances on Sidewalk.**

(N. Y. Sup.) A pedestrian is not entitled to an absolutely level and unobstructed passway, and must exercise his right of passage along the sidewalk with regard to lawful incumbrances or inequalities, and where, through inattention, he suffers injury, there can be no recovery.—Daly v. Rector, Church Wardens and Vestrymen of Trinity Church in City of New York, 176 N. Y. S. 734.

**Maintenance of Waste Box Governmental Function—Liability for Injury.**

(Ga.App.) The maintenance of a waste-paper box and the removal of its contents is an act by a municipality in the performance of its governmental functions.—City of Savannah v. Jones, 99 S. E. 469.

Where city's employé, after removing contents of waste-paper box, left top or cover open and extending over sidewalk, so that, as plaintiff was walking on sidewalk, the projecting cover, which he did not see, caused an injury, the city would be liable in damages as for breach of its ministerial duty to keep sidewalks clear from obstruction, though in maintaining box it was exercising a governmental function.—Id.

**Smooth Tile Sidewalk for Advertising Purposes—City Liable for Injuries.**

(Ky) A municipality is not responsible for injury to one falling upon a pavement, unless the pavement was inherently dangerous, or was constructed and maintained according to a plan which was not reasonably safe, and which a reasonably prudent person would not have adopted or maintained.—Schmidt v. City of Newport, 212 S. W. 113.

While a city is not an insurer of the safety of persons traveling upon its streets, it has the duty of exercising ordinary care to keep and maintain its streets and pavements in a reasonably safe condition for use by the public, once it has undertaken to do so.—Id.

The mere fact that a payment is constructed of smooth tile is not sufficient in itself to render it so dangerous and unsafe as to fix liability upon municipality for injuries to persons falling thereon, or even to raise a presumption that such walk is inherently dangerous, but it is in a glazed, highly polished condition, rendering it slick and slippery, which makes it so inherently dangerous as to render the city liable.—Id.

The liability of the city for injuries from defective street does not arise until the city, through its authorized officers, has received or has had reasonable opportunity to obtain knowledge of such defective condition; but the municipality will be charged with notice of such defects as it could by the exercise of reasonable care have discovered, and where it authorized the use of a sidewalk by property owner for advertising purposes, and injury resulted directly or proximately therefrom, the city is lialbe.—Id.

**Local Motor Vehicle Regulations Valid.**

(Ala.) Where there is an express legislative grant to a municipality of power to ordain to a particular effect, or to do a particular thing, the municipal ordinance expressive of that power cannot be inquired into with respect to its policy or reasonableness.—City of Montgomery v. Orpheum Taxi Co., 82 So. 117.

Since under Const. 1901, § 220, the use of the streets, etc., of cities, towns, and villages for the carrying on of any business for the conduct of any public utility of private enterprises is made dependent upon consent of the local municipal authorities, such authorities may prescribe the conditions under which the use of the streets, etc., may be enjoyed.—Id.

Penal ordinance of Montgomery prescribing regulations for driving, parking, and stopping of motor vehicles operated for hire, and requiring chauffeurs to procure license from city and furnish a bond, held valid, though in conflict with Gen. Act 1911, pp. 634-650, § 32, in view of Const. 1901, § 220, and Code 1907, §§ 1340, 1452.—Id.

**Private Construction of Sewer—Delegation of Power.**

(Minn.) An ordinance authorizing named persons to construct and maintain a sewer and permitting any person desiring to connect therewith to do so on payment to grantees of his proportionate part of the cost with interest was not void as delegating non-delegable powers to the grantees.—Lee v. Scriver, 172 N. W. 802.

**Compliance of Street Improvement with Contract—Assignments by Contractor.**

(Ind.) Assignment by contractor of assessments to be made on completion of street improvement, and its acceptance by the city conferred on assignee an equitable interest therein, which was subject to any defenses which might exist against contractor, and gave him no right thereunder which contractor could not have successfully asserted in absence of assignment.—State v. City of Indianapolis, 123 N. E. 405.

Under Burns' Ann. St. 1914, § 8711, contractor of street improvements has no right to have work finally accepted by board of public works of a city until it is completed in accordance with the terms of the contract.—Id.

Board of public works, having made an order approving report of city engineer that street improvements have been made according to contract and accepting the work, can rescind order upon discovery that work has not been properly constructed, and has duty of so doing, unless rights of innocent parties have intervened, so as to make such a course inequitable.—Id.

Board of public works' decision as to whether street improvements have been made in substantial accordance with the contract is quasi judicial in its nature, and when made is conclusive, in absence of fraud, on all persons affected thereby, being immune from collateral attack, and subject to be set aside by the court only in a direct proceeding for that purpose based on fraud.—Id.

Whether street improvement substantially complies with contract is to be determined by board of public works from the real character and condition of the improvement tendered for acceptance, unaffected by any considerations of waiver arising from conduct of the engineers or inspectors who superintend the work; such engineers having no authority to waive defects or radical departures from the contract.—Id.

Where contractor assigned assessments before board of public works had taken any action toward accepting or rejecting the work, the board, in rescinding order of acceptance thereafter made, did not prejudice assignee's rights; assignee being in no more advantageous postion than contractor would have occupied.—Id.

Contractor's assignee cannot complain of refusal of board of public works, upon rejection of work for noncompliance with the contract, to take steps, by contract or otherwise, to complete the work and make it conform to the contract; the city being under no duty to contractor to cause work to be completed.—Id.

# THE MUNICIPAL INDEX

### In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading ones published in other countries, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief in this is to keep our readers in touch with all the current literature on municipal matters. In addition to the titles, where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article. Also the name and the place of publication of the periodical in which it appeared.

## ROADS AND STREETS.

**Engineering:**

Highway Engineering. Relation between highway and railway engineering; growth of motor vehicle transportation; its effects upon engineering practice in highway work; opportunities in road engineering. By W. G. Thompson, state hwy. engr. of New Jersey, in address before American Assn. of Engineers. 1500 words. Good Roads, Oct. 1, New York.

Some Suggestions for Highway Designs. Connecting state systems; combining materials; specific tests recommended. By G. W. Tillson, La Grange, Ill. 1550 words. Municipal and County Engineering, October, Indianapolis, Ind.

Course in Highway Engineering and Transport. University of Michigan is offering short-period graduate course. 200 words. Municipal Journal and Public Works, Oct. 25, New York.

Proposed Schedule of Salaries for State Highway Engineers. Preliminary report of American Association of Engineers' Committee submitted for discussion before adoption. 1000 words. Engineering News-Record, Oct. 2, New York.

**Construction:**

Construction of Portland Cement Concrete Pavement Foundations. Careful construction important; consistency and thorough mixing; curing. By J. W. Routh, Bureau of Municipal Research, Rochester, N. Y. 6 ills., 2300 words. Municipal and County Engineering, October, Ineiapolis, Ind.

Large Paving Mixer Puts in 180-Yard Slab Every Hour. Bulk cement is clamshelled from gondola cars to bins; boxes carrying proportioned batches crane-charged into mixer. 5 ills., 1400 words. Engineering News-Record, Oct. 2, New York.

Constructing Pavements by Halves. Discussion of construction details governing work of laying various types of hard-surfaced pavements by halves. By W. L. Hempelmann, engr. Middle Western Division, Asphalt Sales Dept., Taxas Co. 2 ills., 1600 words. Good Roads, Oct, 15, New York.

Convict Labor Builds Concrete Road in West Virgina. 500 words. Southern Good Roads, October, Lexington, N. C.

Machines Take Place of Men on 20-Mile Concrete Road. Grading, sub-grading and slab construction are machine operations on Lincoln highway from Dekalb to Geneva, Ill. 4 ills., 2300 words. Engineering News-Record, Oct. 2, New York.

**Financial:**

Highway Expenditures in 1918. Data compiled by Bureau of Public Roads indicate total expenditure of $300,000,000 on country's rural roads. By A. P. Anderson, hwy. engr., Office of Public Roads, U. S. Dept. of Agriculture. 3 tables, 3000 words. Good Roads, Oct. 8, New York.

Paving Prices in New Orleans. 100 words. Municipal Journal and Public Works, Oct. 18, New York.

A State Bond Issue for Highway System. Address before Virginia Good Roads Ass'n by Hon. B. Page, second auditor. 2000 words. Southern Good Roads, October, Lexington, N. C.

Unlimited Funds for Road Construction. Total amount available for hard-surface highways in 1920 is $633,000,000. 500 words. Municipal Journal and Public Works, Oct. 25, New York.

Road Contracts Being Completed in Kansas Refute False Statements About Highway Costs. Reprinted from August number of Kansas Highways, official state highway organ. 900 words. Municipal and County Engineering, October, Indianapolis, Ind.

High Cost in Highway Maintenance. Excerpts of paper by F. S. Greene, New York State Commissioner of highways, on high cost of maintenance of light macadam roads 1000 words. Modern City, October, Baltimore, Md.

**Bituminous:**

Tarred Roads and Horse Traffic. Horse owners have genuine grievance. Editorial. 500 words. Municipal Engineering and Sanitary Record, Oct. 23, London, England.

Characteristics of Bitoslag Pavement. Representative installations. By J. R. Draney, Bitoslag Paving Co., N. Y. C. 1000 words. Municipal and County Engineering, October, Indianapolis, Ind.

Tarred Limestone Macadam. Should be used to greater extent than at present. Discussion of paper by W. H. Lintern entitled "Notes on the Problem of Road Construction," at meeting of Ass'n of Somersetshire Surveyors. 2000 words. Municipal Engineering and Sanitary Record, Oct. 2, London, England.

**Concrete**

Resurfacing Concrete Pavement. Description of how two steel bridges in Tiogo county, N. J., were resurfaced by method that might be applied to roads also. 300 words. Municipal Journal and Public Works, Oct. 11, New York.

Paving Alley with Concrete. Method of overcoming difficulties of work at Covington, Ky., worked out by Metzel & O'Hearn, and adopted as standard by the city engineer. 1 ill., 300 words. Municipal Journal and Public Works, Oct. 18, New York.

Significance of Cracks in Reinforced Concrete Construction. 800 words. Engineering and Contracting, Oct. 22, Chicago.

Concrete in Road Building. Paper before N. C. Good Roads Association, by A. N. Johnson, consltg. highway engr., Portland Cement Association. 1600 words. Southern Good Roads, October, Lexington, N. C.

**Other Materials:**

Macadam Construction of Primary and Secondary Feeder Highways. By W. C. Buetow, div. engr., Wisconsin Highway Commission, LaCrosse, Wis. 2300 words. Municipal and County Engineering, October, Indianapolis, Ind.

Stone and Gravel Road Construction in Ontario. By J. G. Wilson, county road supt., Halton, Ont. 1300 words. Municipal and County Engineering, October, Indianapolis, Ind.

Earth Road Work in a Nebraska County. Hall county's experience in carrying out a contract for a 32-mile job has demonstrated that earth roads can be built for 30c. per cubic yard and that counties succeed in contracting to do their own state and federal aid work. From monthly report of Nebraska Department of Public Works. 2300 words. Good Roads, Oct. 15, New York.

Hard Surface Roads. Paper before N. C. Good Roads Ass'n, by E. J. Wulff, U. S. Bureau of Public Roads. 5300 words. Southern Good Roads, October, Lexington, N. C.

Paving North Carolina State Roads. Suggestion of types preferred by state given out in "notice to contractors" by W. S. Fallis, state hwy. engr. 150 words. Municipal Journal and Public Works, Oct. 11, New York.

**Shade Trees**

Shade Trees in Public Roads. Editorial with reference to "Arbor Day" movement in United States. 300 words. Municipal Engineering and Sanitary Record, Sept. 25, London, England.

Suitable Trees for Roads. Editorial. 300 words. Municipal Engineering and Sanitary Record, Sept. 25, London, Eng.

Shade Trees and Their Value. Growth must be controlled by judicious pruning. Editorial. 400 words. Municipal Engineering and Sanitary Record, Oct. 30, London, England.

**Miscellaneous:**

Trustees Plan for Real Highway. Report of meeting of trustees of Central Highway, Greensboro, N. C., by G. G. Dickson. 1500 words. Southern Good Roads, October, Lexington, N. C.

Central Highway a Great North Carolina Boulevard. By Hon. J. H. Pou, Raleigh. 1 ill., 1900 words. Southern Good Roads, October, Lexington, N. C.

The Need of the Nation. National highway system built and maintained by the federal government most urgent need of nation; mileages required in various systems; solution of problem the Townsend Road Bill. By M. O. Eldridge, dir. off roads, American Automobile Assn's. 1400 words. Good Roads, Oct. 1, New York.

Big Wages for Roadmen and Dustmen. Low Wages for Officials. Is It the Definite Policy of Labor? Letter to the editor. 500 words. Municipal Engineering and Sanitary Record, Oct. 30, London, England.

Arguments Favoring National System of Improved Highways, Constructed, Maintained and Financed with Federal Funds. By M. O. Eldridge, Director of Roads, American Automobile Ass'n, Washington, D. C. 1400 words. Municipal and County Engineering, October, Indianapolis, Ind.

Property Owners Not to Select Paving. Resolution adopted at recent special meeting of N. J. Ass'n of County Engrs. 300 words. Municipal Journal and Public Works, Oct. 11, New York.

Considerations Affecting the Choice of Highway Culvert Materials in Oklahoma. By M. L. Cunningham, state engr., of Oklahoma City. 800 words. Municipal and County Engineering, October, Indianapolis, Ind.

Some Notes on English Highway Construction. By H. T. Chapman, county surveyor, Kent, from "The Surveyor," London, July 11. 1800 words. Engineering and Contracting, Oct. 29, Chicago.

Concrete Foundations to Wood Paving. Is it necessary to break up solid concrete? Some questions asked by a borough surveyor. 400 words. Municipal Engineering and Sanitary Record, Oct. 2, London, England.

Salvage of Concrete Road Foundations. Editorial and two letters from surveyors in answer to question by borough surveyor in Oct. 9th issue as to necessity of breaking solid concrete when renewing wood pavement. 1000 words. Municipal Engineering and Sanitary Record, Oct. 9, London, England.

Classification of Highways. Should be classified as to their availability to render greatest public service. Paper before N. C. Good Roads Ass'n, by H. G. Shirley, secy. Highways Industries Ass'n and Federal Highway Council. 2700 words. Southern Good Roads, October, Lexington, N. C.

Let 1920 Road Contracts Now. By middle of February contractors should be able to place orders for materials and make preparations for season's work. 300 words. Municipal Journal and Public Works, Oct. 25, New York.

Recommended Procedure in Design, Construction and Maintenance of Asphalt Macadam Pavements. By Prevost Hubbard, chem. engr., The Asphalt Ass'n, N. Y. C. 6500 words. Municipal and County Engineering, October, Indianapolis, Ind.

## SEWERAGE AND SANITATION.

**Sewerage Systems:**

Town Sewerage. Local government requirements; ventilation of sewers; flushing sewers; general "lay-out"; volume of flow to be provided for; position of sewers in roadways; separation of storm-water; pumping. Paper by E. B. Savage, engr. in charge of sewers and rivers dept., corporation of Birmingham, and discussion, at meeting of Institution of Municipal and County Engineers. 11 ills., 10,500 words. Journal of above Institution, Sept. 13, London, England.

Separation of Storm Water and Sewage. By E. B. Savage, engr. in charge of sewers, Birmingham, Eng. From "Proceedings Institute of Municipal and County Engineers." 400 words. Engineering and Contracting, Oct. 29, Chicago.

Cost of Constructing Sewers and Water Mains in Montreal South, Que. By E. Drinkwater, conslt. engr., Montreal, from "Engineering and Contracting," 800 words. Canadian Engineer, Oct. 30, Toronto, Can.

More Engineering on Sewer Inlets. St. Louis types of inlets; theoretical analysis off intakes; tests on detailed shape and position of fsump. By W. W. Horner, chief engr., Sewers and Paving, city hall, St. Louis. 14 ills., 1700 words. Municipal and County Engineering, October, Indianapolis, Ind.

Causes of Offensive Odors from Sewers and Remedial Measures. By E. B. Savage, engr. in charge of sewers, Birmingham, Eng., from paper before Institute of Municipal and County Engineers. 1800 words. Engineering and Contracting, Oct. 29, Chicago.

### Traps:

The Intercepting Trap and New Housing Schemes. Editorial. 500 words. Peter Fyfe, director of housing, on excessive trapping. 400 words. Non-provision advocated with well ventilated sewers. 300 words. Municipal Engineering and Sanitary Record, Sept. 25, London, England.

The Intercepting Trap. Drains connected to old sewer. Letter from N. P. Jasper, resident engr. to London Sanitary Protection Ass'n. 400 words. Unsealing of Traps by Momentum, Evaporation, etc. Letter from H. Davis. 300 words. Municipal Engineering and Sanitary Record, Oct. 9, London, Eng.

The Intercepting Trap. Letter from G. Thomson, with reference to his paper at Perth Sanitary Congress and discussion thereof. 800 words. Municipal Engineering and Sanitary Record, Oct. 23, London, England.

### Sewage Treatment:

Sewage Clarification Tank at Auguste Victoria Colliery. By W. Havercamp, from "Water and Water Engineering," London, Sept. 20. 2 ills., 700 words. Engineering and Contracting, Oct. 29, Chicago.

Bridgeport's Sewage, Screen and Pumping Station. Description of underground station, disc screen and centrifugal pumping plant now under construction. By J. A. McElroy, city engr., Bridgeport 2 ills., 1500 words. Municipal Journal and Public Works, Oct. 11, New York.

Utilizing Sewage Sludge. Editorial reference to article in this issue on sludge utilization in England. 300 words. Municipal Journal and Public Works, Oct. 11, New York.

Sludge Utilization in England. Report of Governmental Committee on utilization of sludge; recovery of grease and nitrogen. 700 words. Municipal Journal and Public Works, Oct. 11, New York.

Utilization of Sewage Sludge. Summary of results and conclusion from experiments conducted for several years at Birmingham, England; digestion of sludge in separate tanks in two stages; avoidance of odor. By J. D. Watson in paper before Institute of Municipal and County Engrs. 3 ills., 400 words Municipal Journal and Public Works, Oct. 4, New York.

Birmingham Sewage Experiments. Editorial reference to Mr. Watson's report in this issue. 200 words. Municipal Journal and Public Works, Oct. 4, New York.

Operating Results of "Direct Oxidation" Experimental Sewage Treatment Plant at Easton, Pa. 1 ill., 4500 words. Canadian Engineer, Oct. 16, Toronto, Ont.

Utilization of Sewage Sludge. Paper before Institution of Municipal and County Engineers of Great Britain. By J. D. Watson, engr., Birmingham, Eng. 7 ills., 5000 words. Canadian Engineer, Oct. 30, Toronto, Can.

Montezuma Sewage Treatment. Some unusual features of a small plant; itemized cost of earthwork, concrete, filter media and drains. 700 words. Municipal Journal and Public Works, Oct. 18, New York .

### Miscellaneous:

Hydraulic Alignment Diagrams. Diagram of hydraulic mean depth of trapezoidal channels; diagram of flow at two-thirds full depth in circular and eggshaped sewers. By D. H. Thompson, M. A., Canterbury. (Continued). 400 words. 2 pages diagrams. Water and Water Engineering, Oct. 26, London, England.

Walkerville Underground Sewage-Pumping Plant. Circular, two-story, reinforced concrete structure, approximately 23 feet diameter and 20 feet high, built entirely below ground level excepting housing for stairway; lower compartment, containing pumps, encircled by suction well and force main. By C. W. Tarr, deputy chief engr., Morris Knowles, Ltd., Windsor, Ont. 7 ills., 800 words. Canadian Engineer, Oct 30, Toronto, Can.

Mosquito Control for the Municipality. Draining wet lands, pools and other places to prevent breeding; clearing out channels and denuding shores; filling in low spots; methods of operation and approximate cost. By W. A. Hardenbergh, ass't sanitary engr., U. S. Public Health Service. 10 ills, 4200 words. Municipal Journal and Public Works, Oct. 18, New York.

City Engineering and Mosquito Control. Editorial reference to article in this issue. 200 words. Municipal Journal and Public Works, Oct. 18, New York.

## WATER SUPPLY.

### Meters and Waste Prevention:

Metering and Water Consumption. Three elements seldom taken in account are: Pressure upon water system; extent of house connections with sanitary sewers; effective size of mains and services. Excerpts of paper before Western Society of Engrs., by H. P. T. Matte, chief sanitary engr., Illinois State Dept. of Public Health. 1500 words. Engineering World, Oct. 1, Chicago.

Sizes of Meters. Practice of Interstate Water Co. of Danville in fixing meter sizes; smaller sizes preferable. 700 words. Municipal Journal and Public Works, Oct. 11, New York.

Water Waste Prevention Should be Continuous. Editorial. 300 words. Municipal Journal and Public Works, Oct. 25, New York.

Water Waste Prevention Surveys in Washington. Have saved a waste of 45 million gallons daily; description of plan and organization by which this has been effected during 13 years of continuous investigation. By P. Lanham, engr. in charge of Div. of Water Survey. 11 ills., 3200 words. Municipal Journal and Public Works, Oct. 25, New York.

Meters Disclose Previous Waste of Millions of Cubic Feet a Year, at Middletown, O. 400 words. Fire and Water Engineering, October, New York.

Philadelphia Fights Water Waste. Successful campaign on broad lines; indispensability of Pitot recorders; their elasticity; high voltage difficulties experienced; annual cost insignificant and value of data great. 8 ills., 1800 words. Fire and Water Engineering, October, New York.

### Pumping

Improved Efficiency of Modern Pumping Units Shown. Latest installation at Minneapolis water works also shows savings of central-station service. 4 ills., 1200 words. Electrical Review, Oct. 18, Chicago.

Tests of a Unaflow Pumping Engine. Information abstracted from paper before New England Water Works Association, by A. Decrow of the Worthington Pump and Machinery Corporation, N. Y. 2 ills., 1000 words. Municipal Journal and Public Works, Oct. 25, New York.

Test of Riverdale Pump, Toronto. Efficiency, B. H. P. and head-gallon curves. By T. M. Jones, chief engr., Bawden Pump Co., Ltd., Toronto. 2 ills., 500 words. Canadian Engineer, Oct. 330, Toronto, Can.

Considerations Affecting Choice of Pumps for Small Water Works. Comparative fuel and first costs of various types of pumping plants for small water works. By H. A. Symonds, Boston, Mass. 1 table, 2200 words. Municipal and County Engineering, October, Indianapolis, Ind.

### Purification:

New Type of Lime and Soda Softening Plant for Water Purification. From "The Surveyor," London, Aug. 15. 2 ills., 1000 words. Engineering and Contracting, Oct. 29, Chicago.

Rotary Water Screens. Being used very successfully in city water department, St. Paul, Minn., for removing solid particles and vegetation from drinking water. By L. N. Thompson, dept. engr., St. Paul. 1 ill., 500 words. Canadian Engineer, Oct. 30, Toronto, Can.

Features of Desrumaux System of Water Filtration. 200 words. Engineering and Contracting, Oct. 29, Chicago.

Toronto Drifting Sand Filters. Description of filter and its principle of operation; some details of operation; variations in turbidity cause difficulties; bacterial results obtained; policy of operation. 5 ills., 1 table, 1800 words. Municipal Journal and Public Works, Oct. 11, New York.

Separation of Solids ffrom Liquids. Gravity filtration, pressure and suction filtration. Abstract of paper by B. G. McLellan, before Society of Chemical Industries. 1200 words. Water and Water Engineering, Oct. 20, London, Eng.

Water Purification at Buffalo, N. Y. Present and prospective. By H. F. Wagner, chemist, Bureau of Water, Dept. of Public Workks, Buffalo. 1300 words. Municipal and County Engineering, October, Indianapolis, Ind.

Some Observations and Experiences in the Operation of Coagulating Basins. Paper before American Water Works Ass'n, by J. W. Armstrong, filtration engr., Baltimore, Md. 5 ills., 1700 words. Canadian Engineer, Oct. 23, Toronto, Can.

Proposed Water Filtration at Detroit, Mich. Experimental filter plant; recommended plant; estimated cost of filtration. 1500 words. Municipal and County Engineering, October, Indianapolis, Ind.

Chlorination of Water Supplies. Discussion of a book by Jos. Race, city bacteriologist and chemist, Ottawa, entitled "Chlorination of Water." 2500 words. Water and Water Engineering, Oct. 20, London, England.

Crenothrix Removal by Chlorine. Conclusions from paper before Indiana Sanitary and Water Supply Ass'n, by W. F. Montfort, conslt. engr., St. Louis. 500 words. Municipal Journal and Public Works, Oct. 11, New York.

Some Peculiarities of Algal Growths in Reservoirs. Editorial in "The Engineer," London, Sept. 5. 1800 words. Engineering and Contracting, Oct. 29, Chicago.

Ozone as a Disinfectant in Water Purification. By J. W. Ellms, consulting and sanitary engr., Cleveland O. 1800 words. Municipal and County Engineering, October Indianapolis, Ind.

### Pipe Lines

The Coolgardie Pipe Corrosion. This line consists of 351½ miles of 30-inch steel pipe, and a great amount of attention has been given to examination of causes of corrosion. Reference to paper and discussion in Proceedings of Institution of Civil Engrs. 2000 words. Water and Water Engineering, Sept. 20, London, England.

Locating Water Main Leak. Describing method devised by Howard White, of Graham, Anderson, Probst & White, archts., Chicago. 1 ill., 300 words. Municipal Journal and Public Works, Oct. 4, New York.

Water Supply for the Cantonments. Use of wood pipe for distribution systems; details of joints and other special features; national guard and embarcation camps. (Concluded.) 4000 words. Municipal Journal and Public Works, Oct. 18, New York.

Assessment for Water Main Extensions in Los Angeles, Cal. 400 words. Engineering News Record, Oct. 2, New York.

### Miscellaneous

Cost Data on Small Water Works Systems. Table of expenditures for water supply systems in small cities and villages in 1919. By W. Artingstall, consulting engr., Chicago. 300 words. Municipal and County Engineering, October, Indianapolis, Ind.

Water Engineering Problems in India. More important directions in which it is possible to develop water resources. 2500 words. Water and Water Engineering, Sept. 26, London, England.

World's Largest Dam. Australian reservoir to contain 272,250,000,000 gallons. water stored for irrigation purposes. 1600 words. Engineering World, Oct. 15, Chicago.

Field Surveys of Water. Director of Division of Sanitation of Minnesota State Board of Health, reported that of 344 unsatisfactory water supplies, field surveys alone revealed 40%. 150 words. Municipal Journal and Public Works, Oct. 11, New York.

Water Supply for the Cantonments. Preparing plans under emergency conditions; quantity provided and actual consumption; standard plans for distribution systems and other features. 1 ill., 2300 words. Municipal Journal and Public Works, Oct. 11, New York.

Stream Flow and Percolation Water. Comparison of peaks of a stream; conditions affecting shape of flow curves and percolation discharge; factors affecting surface run-off. By S. Hall, ass't water engr., Belfast. From Journal of Institution of Water Engrs. of Great Britain. 5 ills., 6000 words. Engineering and Contracting, Oct. 29, Chicago.

The New England Water Works Association Convention. Interesting and instructive papers thoroughly discussed; unusually well planned entertainment program; excellent attendance and well displayed exhibits. 2 ills., 8000 words. Fire and Water Engineering, October, New York.

New England Water Works Association Convention at Albany. Condensed report of the several sessions; reports of committees, papers read and discussions; reservoirs, standpipes, mains, meters, engines and other features considered. 4000 words. Municipal Journal and Public Works, Oct. 4, New York.

Wind Pressures and Wind Stresses in Tower Design. Towers for water tanks, viaducts, wireless aerials and power-transmission lines; six and eight-post towers; wind pressures for design; working stresses for three classes of transmission towers. By R. Fleming, American Bridge Co., N. Y. C. 2 ills., 5000 words. Engineering News-Record, Oct. 2, New York.

## LIGHTING AND POWER.

**Street Lighting:**

Street Lighting and Traffic Accidents. Analysis of year's traffic accidents in Cleveland as to time of day and season shows large percentage due to lack of light; value of good street lighting shown. By Ward Harrison, illuminating engr., Natl. Lamp Works of General Electric Co. 2 ills., 800 words. Electrical Review, Oct. 11, Chicago.

Development of Chicago Street-Lighting System. Progress made by department of electricity; metallic flame lamps. Paper before International Ass'n of Municipal Electricians, by Wm. G. Kieth, commissioner of gas and electricity, Chicago. 2800 words. Electrical Review, Oct. 4., Chicago.

Street Lighting Problem of City of St. Louis. The type "C" series Tungsten 1000 watt lamp; annual cost of lighting "arc" district; gas and naptha sections; municipal ownership suggested. By R. T. Toensfeldt, electrical engr., Department of Public Utilities, St. Louis. 2700 words. Municipal and County Engineering, October, Indianapolis, Ind.

**Hydro-electric:**

Hydroelectric Power Development in British Empire. Further report of British water-power committee on status and plans for development in colonies, etc. 1500 words. Electrical Review; Oct. 11, Chicago.

Hydroelectric Development on Wisconsin River at Stevens Point. Description of development; interesting instance where load was developed with generating station; interconnection of systems. By Wm. F. Snyder, electrical supt., Consolidated Water Power & Paper Co. 5 ills., 2200 words. Engineering World, Oct. 1, Chicago.|

Solving Hydro-Electric Problems of a Small Town. Stable unit secured after two failures; advantage taken of deep, washed-out draft pit to use vertical cone tube. 2 ills., 1200 words. Engineering News-Record, Oct. 2, New York.

Development and Storage of Water for Electrical Purposes. Conditions requisite for water power; flow and storage; rainfall and run-off; evaporation and percolation; reservoirs. Abstract of paper before Institution of Electrical Engineers, by J. W. Mears. 3 ills., 4000 words. Water and Water Engineering, Sept. 20, London, England.

Development and Storage of Water for Electrical Purposes. Lay-out of hydroelectric schemes. head works and clear water. Abstract of paper before Institution of Electrical Engineers, by J. W. Mears. (Continued). 1 ill., 2500 words. Water and Water Engineering Oct. 20, London, England.

Pressures in Penstocks Caused by the Gradual Closing of Turbine Gates. With reference to discussion of N. R. Gibson's paper (see Sept. 4 and 11th issues of Canadian Engineer) by R. D. Johnson, cons. engr., N. Y. C. 2 ills. 13300 words. Canadian Engineer, Oct. 16, Toronto, Ont.

Pressures in Penstocks Caused by Gradual Closing of Turbine Gates. Discussion of paper at American Society of Civil Engrs. by N. R. Gibson. By Ford Kurtz, Muscle Shoals. Ala. 1 table, 1100 words. Canadian Engineer, Oct. 23. Toronto, Can.

Pressures in Penstocks Caused by the Gradual Closing of Turbine Gates. Discussion of N. R. Gibson's paper before American Society of Civ. Engrs. By J. T. Noble Anderson. 300 words. Canadian Engineer, Oct. 30, Toronto. Can.

How to Reconstruct Small Water Power Plants. By R. K. Holland, consulting engr., Ann Arbor, Mich. 3600 words. Municipal and County Engineering, October, Indianapolis, Ind.

**Gas**

New Standards for Gas Service in California. Rules for gas service of railroad commission went into effect Sept. 1 and are thought to represent latest ideas upon this subject. 3500 words. Gas Age, Oct. 1, New York.

New York Welcomes the Gas Men of the Nation. What is to be seen in great metropolis while attending most important conference ever held in gas industry. 9 ills., 1500 words. Gas Age, Oct. 1, New York.

Making of Cement Joints for Cast Iron Pipe. Paper before convention of Pacific Coast Gas Ass'n, by W. M. Henderson, San Francisco. 2 ills., 1 table, 1100 words. Gas Age, Oct. 15, New York.

Ten Vital Points for Gas Association of America may make its resources count for most, summarized by Secretary Wm. B. Way. By E. C. Jennings, director, Pittsburgh Bureau, Gas Age. 1 ill., 1000 words. Gas Age, Oct. 1, New York.

Vital Issues Affecting Gas Industry Today. Address by president of Pacific Coast Gas Ass'n, J. D. Kuster, San Jose, Cal. 5500 words. Gas Age, Oct. 15, New York.

**Miscellaneous:**

Central-Station Rates in Theory and Practice. (13th article). Differentiating between classes of service; value of service according to size of customers and use; isolated plants and other competition in light, power and heat. 4000 words, Oct. 4. (14th article). Rate systems and reasons therefor; class schedules commonly used; minimum and maximum charges, discounts and related features; principal types of rates. 1 ill., 4000 words, Oct. 11. (15th article) Defects of straight meter rate; why large consumers deserve lower rates; detailed study of step meter rate. 8 ills., 5500 words, Oct. 18. (16th article). Block meter rate and its combination with other rates; customer charges; detailed studies of block rates and combinations; average charges with meter rates. 12 ills., 3000 words, Oct. 25. By H. E. Eisenmenger. Electrical Review, Chicago.

Equipment for Handling Coal and Ashes in Power Plants. Influence of methods upon plant operation; classification of mechanical methods of handling coal and ashes; power calculations. By Rob. June, mechanical engr. 1 ill., 2,000 words. Electrical Review, Oct. 25, Chicago.

Coal and Public Utilities. Part of wisdom to use, for public utilities, sources of power other than coal that nature has provided for locality in question. 300 words. Municipal Journal and Public Works, Oct. 25, New York.

Methods of Increasing Capacity of Existing Transmission Lines. Line limitations determining relative costs of increasing capacity. Paper before Pennsylvania Ass'n, by E. C. Stone, Duquesne Light Co. 6 ills., 1 table, 3500 words. Electrical Review, Oct. 4. Chicago.

What Electricity Has Done to Help Humanity. extremely varied and indispensable services performed by electricity in war; value of Niagara Falls hydro-electric development. By J. C. McQuiston, mgr., dept. of publicity, Westinghouse Electric & Mfg. Co. 1 ill., 2000 words. Electrical Review, Oct. 18, Chicago.

New Form of Tank for Static Transformers. Importance of preventing moisture from entering tank and lowering dielectric value of oil; how conservator type of tank prevents this and also explosion risk and sludging of oil. 7 ills., 1700 words. Electrical Review, Oct. 18, Chicago.

Chicago Electrical Show Proves a Noteworthy Success. Elaborate decorative and lighting effects are features of show; all branches of industry make representative exhibit of electrical products. 3 ills., 3000 words. Electrical Review, Oct. 18, Chicago.

Northwest Electric Power Men Hold Important Convention. Central-station delegates from four states and many visitors meet at Seattle; papers and discussions deal with vital problems. By W. A. Scott. 1 ill., 5500 words. Electrical Review, Oct. 11, Chicago.

National Association of Electrical Inspectors Holds Convention at Springfield. Revision of national electrical code from field data principal topic at reconstruction meeting. 5000 words. Electrical Review, Oct. 25, Chicago.

## REFUSE DISPOSAL.

Public Cleansing Matters. Salvage at a Scottish Sanitary Conference. Pig-breeding possibilities. Paper by Wm. Asher, sanitary inspector, Perth. 700 words. Municipal Engineering and Sanitary Record, Sept. 25, London, England.

Public Cleansing Matters. Destructors and use of clinker; house refuse used for sewage filters at Chester. By a superintendent. 600 words. Municipal Engineering and Sanitary Record, Oct. 23, London, England.

Collection and Disposal of Refuse. Choice of trucks; tipping and loading; position of ash bins. By F. W. Brookman, cleansing supt. Rochdale, from "The Surveyor," London, July 11. 1700 words. Engineering and Contracting, Oct. 29, Chicago.

Contract for Garbage Disposal by Feeding Awarded by Newark, N. Y. By J. W. Costello, engrg. superviser, Newark. 1 ills., 700 words. Municipal and County Engineering, October, Indianapolis, Ind.

## FIRE DEPARTMENT.

New York Fire College Course. Fire Streams, Nozzles and Hose Lines. Auxiliary fire appliances in service; perforated pipe systems; sprinkler systems. 2 ills., 2800 words. Fire and Water Engineering, October, New York.

Fire Alarm and Police Control. Figures from report for 1917 of U. S. Census Bureau. 400 words. Municipal Journal and Public Works, October 4, New York.

National Fire Brigades Union. Autumn conference at Oxford, Eng. Possibilities of Petrol-electric Motor for Fire Brigade Work, paper by H. H. Carter. Can Standard of Competitions Be Improved to Promote Greater Efficiency? Paper by Chief Officer S. W. Thorpe. 3000 words. Municipal Engineering and Sanitary Record, Sept. 25, London, Eng.

Fire Prevention at Bridgeport. Chamber of Commerce takes initiative in fostering endeavor to reduce fire loss; address by Capt. Gasser, Newark. 2 ills., 2000 words. Fire and Water Engineering, October, New York.

Pacific Coast Chiefs' Convention. A further account of annual meeting of the association; interesting discussion on tires. By H. W. Bringhurst, secy. 1100 worda. Fire and Water Engineering, October, New York.

## CITY PLANNING.

Planning of Residential Suburbs with Special Reference to Engineering Features. By F. L. Olmsted, landscape archt., Brookline, Mass. 4300 words. Municipal and County Engineering, October, Indianapolis, Ind.

Solution of the Housing Problem. Causes of existing evils; eradication and recurrence of housing evils directed and prevented by national housing scheme; ideals governing development of community; relation between federal, provincial and local government. 10 ills., 6700 words. Western Municipal News, October, Winnipeg, Manitoba.

Joint Town-Planning Conference at Ottawa. Americant City Planning Institute and Town-Planning Institute of Canada discuss zoning, cost of public utilities and street improvements, proper widths for streets and other fundamental considerations of city and town planning. Papers by F. L. Olmsted, chf. town planner for U. S. Dept. of Labor; Morris Knowles, conslt. engr., Pittsburgh, Pa.; B. A. Haldeman, advisory engr., Zoning Comn., Philadelphia, Pa.; E. M. Bassett, chn., Zoning Committee, N. Y. C. 6000 words. Canadian Engineer, Oct. 23, Toronto, Can.

## GOVERNMENT AND FINANCE.

Advantages and Limitations of Commission Government. Subject discussed in bulletin of Bureau of Municipal Research, of Toronto, Ont. 700 words. Municipal Journal and Public Works, Oct. 4, New York.

How to Finance Public Improvements in Illinois Villages. Four methods of raising money; special assessment for local improvements; statutory authority. By W. Artingstall, consulting engr., Chicago, Municipal and County Engineering, October, Indianapolis, Ind.

Some Common Errors in Municipal Financing. Lack of modern accounting methods; improper handling of bond issues; failure properly to regulate franchises. By A. R. Hebenstreit, city manager, Albuquerque, N. Mex. 1100 words. Municipal and County Engineering, October, Indianapolis, Ind.

Why Municipal Expense and Income Data Are Usually Deceptive. 1100 words. Engineering and Contracting, Oct. 22, Chicago.

## STRUCTURES AND MATERIALS.

Strength of Malleable Iron. Relation between strength of a specimen and its position in a casting. 3 ills., 2000 words. Engineering World, Oct. 1, Chicago.

Geology of Concrete Aggregates with Special Reference to Texture. By Prof. P. G. H. Boswell, from "Concrete and Constructional Engineering," London. 4000 words. Engineering and Contracting, Oct. [illegible] Chicago.

Wood as Reinforcement for Concrete. From "Beton u. Eisen," 1919. 2 ills., 500 words. Engineering and Contracting, Oct. 29, Chicago.

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# NEWS OF THE SOCIETIES

**Dec. 10.** AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS. Annual convention, Louisville, Ky.

**Dec. 25.** AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Annual meeting, New York City. Secretary, Calvin W. Rice, 29 West 39 st., New York City.

**Feb. 9-13, 1920.**—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention, Louisville, Ky. Secretary, E. L. Powers, 150 Nassau street, New York.

**May 18-21, 1920.** NATIONAL ELECTRIC LIGHT ASSOCIATION. Annual convention, Pasadena, Cal. Acting Secretary, S. A. Sewall, 29 West 39 st., New York City.

## American Association of Engineers

The American Association of Engineers announces a membership drive during the first two weeks of December. There will be nine thousand "salesmen," ninety branch sales offices, and four district "sales offices." The method to be employed is similar to that used in obtaining subscriptions to the Liberty Loans. The ninety clubs and chapters will divide their members into membership teams, each with certain territory to cover, and under the supervision of a team captain. The drive will be handled for each chapter by a drive commander who will keep in direct touch with the national headquarters of the Association by telegraph. He will make telegraph reports of the number of applications obtained each day. A force will be maintained at the national headquarters to tabulate the returns and to advise the chapters of their standings.

For the purpose of competition chapters and clubs will be divided into two groups: those having more than one hundred members at midnight on December 13th, when the drive ends, and those having less than one hundred members on that date. A special gavel will be presented to the chapter of club in the latter group which has the greatest percentage of increase of membership during the drive. Of the chapters having one hundred or more members at the end of the drive, official A. A. E. colors will be presented to the one that has obtained the greatest percentage membership increase during the drive.

The three members securing the greatest number of applications between the first and thirtenth of December, inclusive, will be awarded respectively a life membership in A. A. E., a collection of books to the value of $100, and a watch of the value of $50. The captain of the membership team in each chapter or club which obtains the greatest number of applications of all the teams in that chapter of club will be awarded a solid gold, engraved, A. A. E. watch fob. Individual chapters and clubs may award special prizes to their members.

The referee of the drive is Isham Randolph, consulting engineer of Chicago.

With a membership of almost 8500 at the end of October, it is probable that the American Association of Engineers will easily pass this year the ten thousand membership mark which was set last spring as a goal for 1919.

The Milwaukee Chapter of the American Association of Engineers has submitted a schedule of salaries for the various engineer employes of the city to the city council. The council did not take definite action on October 21, when the request was presented, but will do so inside of a week or two. The following positions are the principal ones affected by the proposed increases; chief engineer of sewers, office engineer of water department, field engineer of water department, chief draftsman, division engineer of street construction and chief estimating engineer.

The Northwest Society of Highway Engineers has voted unanimously to affiliate with the American Association of Engineers. The vote was informal. After the constitutional amendments which are required are made the affiliation can be formally consummated. It is expected that an amalgamation will be possible in January.

The Southwestern Society of Engineers, of which Dean G. M. Butler of the University of Arizona is president, has recently decided to affiliate with the American Association of Engineers.

The sub-committee of the American Association of Engineers on salaries of engineers in municipal service has been completed with S. C. Hadden, editor of Municipal and County Engineering, as chairman and with the following other members; John Ericson, consulting engineer of the Board of Public Works, Chicago; M. M. O'Shaughnessy, city engineer, San Francisco, California; O. Laurgaard, city engineer, Portland, Oregon; W. W. Horner, chief engineer, St. Louis, Missouri; E. R. Conant, consulting engineer, Savannah, Georgia; Geo. D. Fairtrace, city engineer, Dallas, Texas; Arthur B. Farnham, city engineer, Pittsfield, Massachusetts; George G. Earl, general superintendent, Sewerage and Water Board, New Orleans, Louisiana; F. C. Lohman, city engineer, Champaign, Illinois; L. B. Hitchcock, city engineer, Phoenix, Arizona; Guy H. Stevens, city enginer, Auburn, Maine; E. A. Ziesloft, city engineer, Akron, Ohio; O. E. Carr, city manager, Springfield, Ohio; W. J. Alexander, city manager, Gastonia, North Carolina; W. E. Baldry, city engineer, Topeka, Kansas; John C. Chambers, city engineer, Louisville, Kentucky; Arthur A. Reimer, consulting enginer, East Orange, New Jersey; F. L. Raschig of Cincinnati, Ohio; S. Q. Cannon, city engineer Salt Lake City, Utah.

The committee estimates that there are in the neighborhood of fifteen thousand municipal enginers in the United States. It is expected that a municipal engineering schedule will be issued soon.

## National Safety Council.

The formation of an engineering section of the National Safety Council has been authorized by the Executive Committee of the Council and the new section will be organized immediately by a special commitee appointed for the purpose.

In announcing this action, Sidney J. Williams, secretary and chief engineer of the National Safety Council said the decision to form a distinct engineering problems affecting safety work three considerations: first, the growing recognition of the importance of the engineering factor in safety work; the growing interest in safety work on the part of civil, mechanical, electrical, engineers; the growing volume of experience and investigation in the engineering problems involved in safety work.

"The formation of an engineering section," as Mr. Williams points out, "will provide a vehicle for concentration of the engineering brains of the several thousand member companies of the council on the solution of engineering problems affecting safety work in industry.

"The development of the Council has been largely along the lines of industrial sections. The Council now has 19 sections each with its own officers and program and each interested largely in the safety problem of its own particular field. These sections are as follows:

"Automotive, Cement, Chemical, Construction, Education, Electric Railway, Health Service, Marine and Navigation, Metals, Mining, Packers, Paper and Pulp, Public Safety, Public Utilities, Rubber, Steam Railroad, Textile, Women in Industry and Woodworking.

"The greatest contribution of the new engineering section will be with respect to problems that cut across the interests of several sections and affect whole groups of industries as, for instance, the hazards of poisonous dust or gas. The new engineering section will also facilitate contact and co-operation between the various national engineering societies, the engineering departments of the Government and the National Safety Council."

# INDUSTRIAL NEWS

## Street Cleaning Officials Attend Elgin Conference.

The third annual Elgin conference was held at Chicago and Elgin, October 2, 3 and 4. In connection with this meeting, there was a conference of street cleaning officials, which was attended by about fifty officials. With the exception of two meetings of street cleaning officials held in New York in 1915 and 1916, this was the first meeting of this nature that is on record. Each year, the sales, service, and factory departments of the Elgin organization meet in Chicago for conference.

October 2 was given up to the sessions of the Elgin organization with a reception to the visiting officials at 5 p. m., after which an auto ride was taken around the Chicago Boulevards. A smoker and grill supper were held in the Auditorium Hotel in the evening.

The forenoon of October 3 was taken for the morning session of the Conference of Street Cleaning Officials. This conference was conducted by W. J. Galligan of the street cleaning department of the city of Chicago and N. Goss, commissioner of public works of St. Paul.

These subjects were under discussion: street flushing; dry sweeping; uniforms; hand-brooming vs. machine sweeping; labor conditions—outlook—unions—wages; co-operation of citizens—litter prevention; co-operation of police; snow removal; garbage collection and disposition; ashes and refuse collection and disposition; oiling of pavements; street openings—temporary care.

Headquarters of the Conference were the La Salle Hotel. An auto trip of inspection of interesting features of the public works department of the city of Chicago occupied Friday afternoon. This trip included a visit to the municipal pier, the garbage disposal plant, the city's repair and store yards, etc. There was a trip to the Elgin factory where Elgin machines and auto-sweepers were seen in the making.

A complete report of the meeting is in preparation and will be mailed to anyone interested on application to Elgin Sales Corporation, 501 Fifth Avenue, New York City.

**The Goodyear Tire & Rubber Co.** employes now have an "Industrial Assembly" consisting off 20 "senators" and 40 "members of the house of representatives" who pass all laws affecting the conduct and welfare of the men. The plan was instituted four months ago and the latest question to be taken up is that of food prices. The Employees' Store Committee of the Industrial Assembly is now buying and selling potatoes under a cooperative plan and other food commodities are being investigated with a view to buying in carload lots.

## PERSONALS

Brown, Linn, has been appointed city engineer of Jefferson City, Mo.

Whelan, Joseph A., Trenton, N. J., has been appointed assistant superintendent of the Michigan State Highway Department, with headquarters at Ann Arbor. He was engaged in road-building in Trenton for some time.

Coleman, Roy D., county engineer for Atchison County, Kansas, for several years, has been appointed Government resident engineer for the Atchison district in the construction of hard-surface roads. Robert Kerr has been appointed county engineer.

Legaré, T. Keith, announces that he has resigned the position of city engineer of Columbia, S. C., and has opened an office in the Hook bldg., Columbia, as consulting engineer specializing in highway and municipal engineering. He will act as district engineer for Dow & Smith, consulting paving engineers, for the Sharman Concrete Pipe Co., and the Legare Templet Co.

## MUNICIPAL INDEX

*(Continued from page 286.)*

Geology of Concrete Aggregates. Editorial in "Concrete and Constructional Engineering," London, July. 2000 words. Engineering and Contracting, Oct. 29, Chicago.

Concreting In Cold Weather Offers Strong Advantages to Owners. By A. E. Wells, pres., Wells Bros. Constr. Co. of Canada, Ltd. 1000 words. Canadian Engineer, Oct. 23, Toronto, Can.

Concreting in Cold Weather. By A. E. Wells, pres. Wells Bros. Constr. Co. 1100 words. Engineering and Contracting, Oct. 22, Chicago.

Concrete and Its Application. Conclusions from laboratory experiments; advice as to proportioning concrete. 800 words. Municipal Engineering and Sanitary Record, Oct. 30, London, Eng.

Concreting Procedure on Miami Flood-Control Dams. Equipment and methods standardized for five separate jobs; standard product secured by test control of varying aggregates. 7 ills., 3200 words. Engineering News-Record, Oct. 2, New York.

Concrete I-Beams Used to Make Crib Retaining Wall. Combined flexibility of wood crib with permanence of concrete; developed on Cleveland railroad for soft ground. 4 ills., 700 words. Engineering News-Record, Oct. 2, New York.

Burnt Earth Concrete, with Iron and Wood Reinforcement. By L. P. Hodge from "Engineering," London, Sept. 5. 1 ill., 1900 words. Engineering and Contracting, Oct. 29, Chicago.

Strengthening Old Bridges by Doubling Up the Trusses. 1 ill., 900 words. Engineering and Contracting, Oct. 22 Chicago.

Load Concentrations on Steel Floor-Joists of Wood Floor Highway Bridges. 5 ills., 1500 words. Engineering and Contracting, Oct. 22, Chicago.

Unusual Design and Joint Details of 430-Foot Bridge. Heat-treated steel eyebars and high-carbon steel built-up members used in Warren-type truss for economy in material. 2 ills., 800 words Engineering News-Record, Oct. 2, New York.

Stress Measurement of Bridges. From "The Engineer," London, Aug. 1 and 8. 1 ill., 4000 words. Engineering and Contracting, Oct. 29, Chicago.

Excavation of New York-New Jersey Vehicular Tunnel. By J. F. Springer. 5 ills., 3000 words. Engineering World, Oct. 15, Chicago.

### MISCELLANEOUS.

Classification and Salaries of Engineers. Toronto engineers adopt schedule of titles, qualifications and minimum salaries for technically-trained men employed by railways, municipalities, industries, public works and large public utilities; salaries range from $1,200 to $12,000 per annum. 6500 words. Canadian Engineer, Oct. 23, Toronto, Canada.

The Public and the Engineer. Discussion regarding insufficient compensation of engineers, their relation to public affairs, and the oversupply of engineer graduates. By C. Hansel, advisory engr. and investigator. N. Y. C. 2000 words. Engineering News-Record, Oct. 2, New York.

Some Problems Confronting Municipal Engineers in England. Supply of materials; labor difficulties; use of machinery necessary. By C. Brownridge, boro engr., Birkenhead, England. 1300 words. Municipal and County Engineering, October. Indianapolis, Ind.

What the War Has Done for Engineers, and Part Engineers Have to Play in Reconstruction. By Col. R. E. B. Crompton; Abstract of presidential address before Junior Institution of Engineers. 3000 words. Engineering and Contracting, Oct. 29, Chicago.

Reconstruction Problems of British Municipal Engineers. By E. J. Elford, municipal engr., Cardiff. From Journal of Institution of Municipal and County Engineers, London. 1800 words. Engineering and Contracting, Oct. 29, Chicago.

Why Do Most Practicing Engineers Study So Little? Editorial. 2500 words. Engineering and Contracting, Oct. 29, Chicago.

National Department of Public Works vs. Corps of Engineers, U. S. A. By Isham Randolph. 1500 words. Engineering World, Oct. 1, Chicago.

Cost Plus Contract with Minimum Fee Guarantee. 900 words. Engineering and Contracting, Oct. 22, Chicago.

Advantages of Cost Plus Form of Contract. Abstract of address By Brig.-Gen. R. C. Marshall, Jr., Chf. of Constr. Div., U. S. A., Washington, D. C., before Boston Society of Civ. Engrs. 5600 words. Engineering and Contracting, Oct. 22, Chicago.

Cost-Keeping in Cost-Plus Fixed-Fee Contracts. How costs are kept under cost-plus-fixed-fee contract; books kept at job office; open for owner's and architect's inspection. By F. A. Wells, vice-pres. and treas., Wells Bros. Constr. Co., Chicago. 5 ills. 2800 words. Engineering World, Oct. 15, Chicago.

The Overhead Cost in Contracting. What overhead consists of; how to figure overhead and proper selling price of a job. From paper before Master Builders' Ass'n of St. Louis, by Dan Carey. 2600 words. Engineering and Contracting, Oct. 22, Chicago.

Bidding on Public Work. When officials can and can not exercise discretion; must observe provisions under which bids were invited; rejecting all bids. By J. J. Simpson. 2800 words. Municipal Journal and Public Works, Oct. 25, New York.

Sextant and Stadia-Rod Method for Measuring Distance. Topographic mapping of Alaska coast line facilitated by special stadia; accuracy tested with good results. By B. A. Baird, San Francisco. 1600 words. Engineering News-Record Oct. 2, New York.

Transportation Surveys for Rural Motor Express Routes. By J. A. Collins, 2000 words. Southern Good Roads, October, Lexington, N. C.

British Excavating Machinery. By A. E. Collins, city engr., Norwich, Eng., from "Water and Water Engineering," London, Sept. 20. 3 ills., 1800 words. Engineering and Contracting, Oct. 29, Chicago.

School Building Program. Letter by L. D. Upson, director, Detroit Bureau of Governmental Research, in answer to editorial in recent issue of this journal. 360 words. Municipal Journal and Public Works, Oct. 4, New York.

Rules for Drafting Practice. Cover concisely dimensions of drawings, allowable scales, character of lettering and many other points. 1000 words. Canadian Engineer, Oct. 16, Toronto, Ont.

Reconstruction and Civic Development. What we have learned from war and what we can take from Europe; "co-operation" the slogan for reconstruction period. Excerpts from address before Canadian Club of Ottawa, by C. H. Mitchell, dean of faculty of applied science and engrg. University of Toronto. 3000 words. Canadian Engineer, Oct. 30, Toronto, Can.

An Equalizing Reservoir for Labor. Some system should be devised by which occasional labor surplus could be utilized to benefit both laborer and public. 400 words. Municipal Journal and Public Works, Oct. 18, New York.

Houston in the Food Business. City has taken over three stalls in market house. 150 words. Municipal Journal and Public Works, Oct. 25, New York.

Mechanical Device for Reading Curves and Tables. Simplifies determination when charts require simultaneous readings of several elements; charts cleared. 1 ill., 700 words. Engineering News-Record, Oct. 2, New York.

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City County State

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Information Bureau

*The Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.*

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## MONEY VALUE OF LIGHT AND AIR.

Where "the sky is the limit" for height of buildings, it may also be the only direction from which light can be obtained by older buildings surrounded by ambitious neighbors; which means that skylight windows are the only ones that receive direct light, and these receive sunlight for only a few hours a day. The actual deterioration of property value caused by such a condition may not always be realized.

An illustration is cited in the Newark building zone report in this issue. After the destruction by fire of the Equitable building in New York, owners of the surrounding land offered to pay two and a quarter million dollars if the new building would be restricted to a height of eight stories. This was a closely figured business proposition, and demonstrates that the absence of a building height ordinance limiting the height to 100 feet cost these two or three properties at least that amount of money in rental values capitalized.

No matter how high a new building may be carried, a newer can be carried higher unless restrained by law, and no builder can be assured that the value of his property will not be lowered disastrously by overshadowing buildings in a year or two after construction.

A citizen is as surely entitled to protection by the city from this theft of property value as from theft of his purse by robbers or of his good name by libel.

## NON-RIGID PAVEMENT FOUNDATIONS.

It has come to be accepted by many engineers as a foregone conclusion that a so-called "permanent" pavement must have a cement-concrete base, this including brick, wood block, stone block, sheet asphalt, and in many cases bituminous concrete also. It is true that several prominent authorities have contended that a bituminous concrete base was preferable for a bituminous surface, and that many brick pavements laid directly on a sand foundation and stone block ones laid on gravel have given excellent service; but such construction has generally been looked upon as out of date and make-shift.

At the convention of the American Society for Municipal Improvements, however, several prominent paving experts advocated the use of old macadam, and even the laying of new macadam, as preferable to laying a new concrete base for these durable pavements. This was not solely or even chiefly because of the saving in cost—in fact most of the speakers said little conceiving this—but because of the advantage of a porous, non-rigid base. One paper contained the statement that, for a bituminous wearing surface, rigidity of base "is actually detrimental under many if not most conditions of subsoil and drainage." For brick pavement, a rolled broken-stone base was recommended as practically eliminating injury from frost action.. Bituminous concrete wearing surfaces on a telford base were found, in Essex county, New Jersey, to have suffered less from four years of wear than similar surfaces on concrete base.

These papers, abstracted in this issue, will furnish instructive reading to those interested in paving.

# BUILDING ZONES FOR NEWARK.

## Commission on Building Districts and Restrictions Reports Complete Plan for Zoning, with Proposed Ordinance—Use, Height and Area Districts—Some Unusual Features.

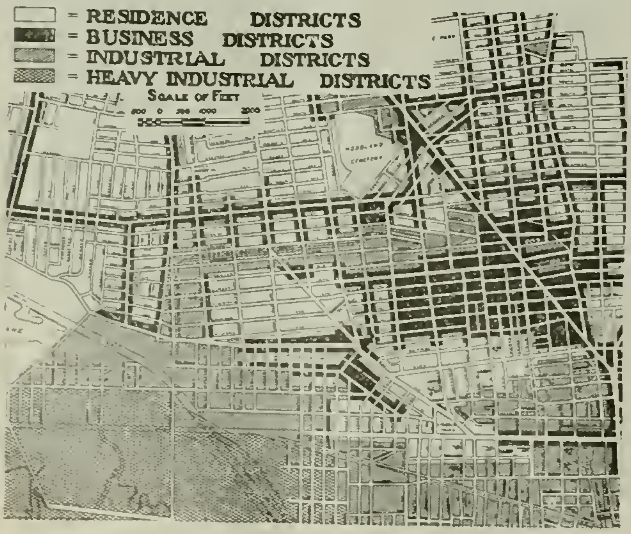
In the issue for March 2, 1916, of Municipal Journal we published a synopsis of a report of the City Planning Commission of Newark, N. J., dealing with proposed changes in the street plan of the city and planning the street layout for future extensions. A "Commission on Building Districts and Restrictions" has since then been considering the subject of building zones for that city, and on September 16th, 1919 approved a report on the subject, together with a draft of a building zone ordinance which it recommends for adoption by the city commissioners. In the following article are given extracts from and a condensation of such parts of this report as seem to us to be of general interest.

"In New York the testimony of real estate experts is almost unanimous that the adoption of the zoning law has stabilized land values. The effect of the zone plan has been particularly noticeable in the districts reserved for detached houses. In such districts there has been an increased demand for private residences since the enactment of the zoning law. The restrictions have resulted in a great improvement of real estate conditions in such neighborhoods."

"Business streets, too, are feeling the wholesome effects of the law. Keeping business off residential streets means keeping it on business streets. Haphazard development hurts business property as much as it does residence property. The sporadic store invading quiet home streets not only demoralizes residential values; in decentralizing the shopping district it also disintegrates business values."

"How zoning can be made of as great help to industry as to residence and business is well illustrated in the case of Alameda. Since the adoption of its zoning ordinance the city has commenced the construction in its industrial district of a belt line railroad which will serve all factories, connecting them not only with each of the several railroads, thus relieving the factories from domination by any one railroad, but with the waterfront so that freight can be floated across San Francisco Bay in carload lots. A highway nowhere less than one hundred feet in width, skirting the edge of the industrial district throughout the length of the city has also been planned. Laid out for the purpose of facilitating the movement of factory traffic, this street will be improved in such a manner that its pavement will stand up under heavy loads and endure hard wear. The protection of the district against fire is also being looked into by the city. So long as factories were allowed to locate anywhere in the city it was difficult to serve them with sufficiently large water mains. But now, as factories may in the future be located only in one district, the city can readily afford to give them all the fire protection they need.

"That the relative competitive strength of a city in the domestic and foreign markets of the world is frequently conditioned to quite as great an extent by the arrangements of the industries within the city as by the availability of raw materials and the proximity of a consuming public is just beginning to dawn upon us. Economical means of transferring and distributing freight within the city contribute proportionately no less to the development and expansion of its commercial and industrial hinterland than efficient outside connections by rail and water. Heavy terminal costs are as much a drag upon a city's prosperity as high freight charges. Every cent saved in needless trucking means just that much more money available for the extension of the city's commercial and industrial radius by rail and water.



USE DISTRICT MAP OF A SECTION OF NEWARK.

"When factories and warehouses are not located with reference to freight terminals, a situation frequently develops where the downtown streets are unnecessarily congested to the inconvenience and financial loss of the whole city. A similar condition results where mutually interdependent industries locate in widely separated parts of the city instead of near one another. It is maladjustments of this kind that zoning is designed to remedy."

This is a part of the expressed opinion of the "Commission on Building Districts and Restrictions" of Newark, N.J., as contained in the introductory part of its report just issued. The report continues by calling attention to the "economic waste and destruction wrought by unregulated building" in Newark, which condition it is believed would be alleviated by the adoption of the restrictions proposed.

Three general classifications of the city are proposed—Use Districts, Height Districts, and Area Districts.

### USE DISTRICTS.

Four classes of use districts are proposed for Newark: residence districts, business districts, industrial districts, and heavy industrial districts. The regulations suggested for the several districts are as follows:

*Residence Districts.*—In a residence district, buildings may be erected only for certain specified uses. The uses that are not specifically permitted are prohibited. The uses allowed are: dwellings and tenements; lodging and boarding houses; hotels; churches; schools, libraries and public museums; hospitals and sanitariums; private clubs; philanthropic and eleemosynary institutions; railroad passenger stations; and nurseries and green houses. Uses customarily accessory to the above uses and located on the same lot are also allowed. Garages for more than five motor vehicles are not permitted as an accessory use.

*Business Districts.*—In a business district buildings may be erected for any use that is not specifically prohibited. The uses excluded from business districts are: garages (except after a public hearing by the board of appeals); blacksmith shops; horse-shoeing establishments; milk bottling and distributing stations; carpet and bag cleaning establishments; coal yards; lumber yards; car barns; junk yards; and those trades and industries that are prohibited in an industrial district. The manufacture of such products as are sold at retail on the premises to the ultimate consumer is allowed in a business district: manufacturing that does not come within this description is prohibited.

The business districts in a general way embrace the principal thoroughfares traversing the different residence sections throughout the city and those tenement house districts which have been so badly invaded by business as to make it impracticable to maintain them exclusively for residence purposes. Due to the large number of factories already there, the downtown business section could not be treated as a business district. The only exception to this rule is found in the case of Broad and Market streets, which it was deemed feasible to include as a business district.

*Industrial Districts.*—In an industrial district, buildings may, as in a business district, be erected for any use that is not categorically excluded. The trades and industries banned are all of a noxious or offensive character by reason of the emission of noise, odor, dust or gas, embracing among others, boiler works, acid plants, garbage incinerators, foundries, smelters, slaughter houses, stone crushers, and tanneries.

The industrial districts include large areas outside of the meadows and are found chiefly along the railroads, the Passaic river, the canal, the downtown business section with the exception of Broad and Market streets, and small scattered areas in various parts of the city already developed with industry.

*Heavy Industriol Districts.*—In a heavy industrial district the only use for which buildings may not be erected is for residential purposes. This exclusion, however, does not apply to the erection and maintenance of dwelling quarters in connection with an industrial establishment for the family of one watchman employed upon the premises.

The heavy industrial districts include the greater portion of the meadows and such parts of the Ironbound District as are already devoted to the more offensive trades.

*Exclusion of Residences from Heavy Industrial District*—The exclusion of residences from the heavy industrial district is a special feature of the scheme for Newark. The very reasons that make it desirable to exclude nuisances from residence districts apply with equal, if not greater, force when it comes to prohibiting the erection of new buildings in a district which will in the main be developed with trades and industries especially offensive by reason of the emission of odor, dust, gas or noise. If it is unhealthful for people to live near an isolated factory in a residence district, it is all the more unhealthful for them to live in an isolated residence in a heavy industrial district. Any dwellings erected among the heavier industries in the meadows are doomed in advance to become slums. Wholesome homes simply cannot be maintained under an environment having its character fixed by chemical plants, tanneries, shipways, foundries, and railroad yards.

Factories demand large plots with switching facilities and wide streets improved with pavements that will stand up under the heaviest trucking; dwelling houses require small lots and streets of a sufficient width to serve only the local traffic. The treatment accorded in the two cases is radically different, not only in the subdivision of the land but also in its physical development afterwards.

### HEIGHT DISTRICTS.

*Flat Height Limits vs. Limits Based on Street Widths.*—In working out the height regulations it was deemed better to establish a flat height limit than to vary the height in each particular case according to the street width.

The only exception to this rule is in the case of the narrow streets in the downtown business section, where the application of the height limit generally applicable to buildings in the district will permit the erection of too high buildings. These streets, which in many instances have a width of only thirty and forty feet, are, moreover, so interspersed between wider streets that it is impracticable to segregate them in a separate district with a lower height limit than that applied to the wide streets. In this part of the city, therefore, a multiple of the street width is used to supplement the flat height limit suggested for the district as a whole.

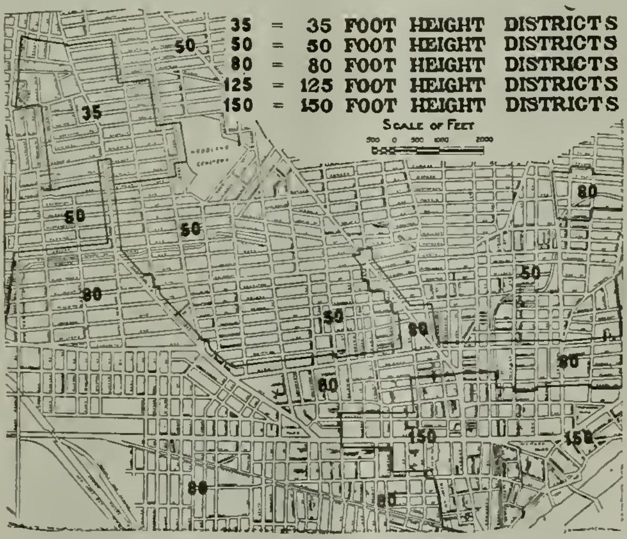
The flat height limit for this district as a whole is 150 feet. But buildings of this height are limited to streets having a width of at least 75 feet.* On streets having a width of less than 75 feet, the height may not exceed twice the width of the widest street upon which the building fronts. In applying this rule, however, no street is deemed to have a width of less than fifty feet, so that even under the most unfavorable circumstances a building is permitted a height of at least 100 feet.

A height limit based exclusively upon a multiple of the street width is objectionable in that it does not promote a uniform type of development throughout a district. Being based upon the street width, it allows higher buildings upon the wider streets, and thus actually invites the location of buildings that will not comport with the general character of the neighborhood. High apartments in a high class private house district are only a little less objectionable than stores. The fact that they happen to be located on a wide street hardly mitigates the injury, as the blight suffered by the adjoining houses is identically the same no mater how wide or narrow the street is on which the apartments front.

Where the height limit is based upon a multiple of the street width, it will usually be found necessary to establish several different classes of height districts, each using a different multiple of the street width. Thus, in New York there are five classes of height districts, two and one-half times districts; two-times districts; one and one-half times districts; one and one-quarter times districts; and one time districts. The height limit, therefore, varies not only according to the width of the street but according to the district in which the building is situated. In applying the New York multiples to only six sets of different street widths, 50, 60, 70, 80, 90 and 100-foot streets, one obtains no less than twenty-two separate and distinct height limits. Whatever may be the need for such a multiplicity of different height limits in New York, it is quite certain that in Newark the application of this method in limiting the height of buildngs would not secure the best results, for there would often be a greater dfference between the height limits established for the widest and narrowest streets within a district than would be the case on the narrowest and widest streets in different districts, and in many instances higher buildings would be allowed on the wider streets in a district apparently subjected to a more stringent restriction than would be allowed on the narrower streets in a district with a more liberal multiple.

There is also another point against adopting a multiple of the street width as a basis for controlling the height of buildings which is entitled to considerable weight. It is this: The wide streets were laid out ostensibly with a view of providing thoroughfares of an adequate width to serve metropolitan through traffic. If they are not to be diverted from this purpose, it is essential that the buildings on them be kept down to approximately the same height as on the neighboring streets of a lesser width, or the increased local traffic resulting from the higher buildings will seriously prejudice their serviceability for through traffic.

*Shadows Cast by Buildings.*—It would be no less than a public calamity for Newark to develop with buildings as high as those in Manhattan, where a preponderating majority of the rooms in the existing shops, factories, offices and apartments receive absolutely no direct sunshine on the shortest day in the year. The shadow cast by a building as on the neighboring streets of a lesser width, or the inat eight o'clock in the morning, over ten times as long as the building is high. At nine o'clock it is four times. By


35 = 35 FOOT HEIGHT DISTRICTS
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HEIGHT DISTRICT MAP OF A SECTION OF NEWARK.

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*In the report and ordinance, "where a street borders a public park or a navigable body of water, the width of the street is the mean width of such street plus the width, measured at right angles to the street line, of such public park or body of water, but not more than seventy-five feet in any case."

ten o'clock it has shortened to two and two-thirds times the height of the building. The shadow continues getting shorter until noon but even then its length is equal to twice the height of the building.

We cannot escape the physical fact that the duration of the sunshine period obtainable in rooms on the ground floor varies inversely to the height of the building. In Newark on a north-and-south street improved uniformly with buildings of a height equal to one-half the street width, the sunshine period obtainable on the ground floor within buildings is one hour and forty-nine minutes on December 21st.* If the height of the building is increased to once the street width this period is reduced to fifty-two minutes. With buildings one and one-half times the street width in height it shrinks to twenty-two minutes and with buildings twice the street width in height to twelve minutes. The ground floors of buildings two and one-half times the street width in height receive absolutely no sunshine.

But the erection of high buildings cuts off not only the sunlight but also the daylight received by the lower floors. The facade of an unobstructed building in the country receives 100 per cent of the maximum possible direct daylight incident on a vertical surface. The front facade of a building at the ground level receives 89.4 per cent of this maximum where a street is flanked on either side with buildings of a uniform height equal to one-half the street width. If the height of the buildings is increased to equal the width of the street the direct daylight is reduced to 29.2 per cent of this maximum. With each increase in height this amount steadily diminishes, being 10.4 per cent. when the height is twice the street width; 5.1 per cent when thrice the street width; and 2.9 per cent when four times the street width.

*Commercial Value of Light and Air.*—A city improved generally with low buildings is not apt to appreciate that sunlight and daylight have a very distinct commercial value. An isolated building projecting high above its neighbors enjoys, of course, an abundance of light and air but it loses this advantage when the district becomes uniformly improved with high buildings.

The monetary interest possessed by owners of skyscrapers in keeping adjoining buildings low is well illustrated in Manhattan by their purchase of easements in the light and air over neighboring buildings above a certain height. After the destruction of the old, and before the erection of the new Equitable Building there, the owners of some of the surrounding land bargained for the purchase of an easement in the light and air above a height of eight stories from the ground. The Equitable Building Corporation was willing to sell such an easement for two and a half million dollars but the project failed as the adjoining property owners were wiling to subscribe only two and a quarter milions toward the purpose.

*Proposed Height Districts for Newark.*—Five classes of height districts are proposed for Newark: 150 foot districts; 125 foot districts; 80 foot districts; 50 foot districts; and 35 foot districts.

Of the 150-foot height districts there is only one, the downtown business section. This limitation will permit the erection of twelve-story buildings. It seemed undesirable to encourage the construction of higher buildings than this for several reasons. First, we are peculiarly fortunate in our topography. The business district is not cramped for room in which to expand. Unlike some cities, we have abundant space for the lateral extension of our retail section—it does not need to extend vertically. Secondly, there are as yet only three buildings in the city that exceed a height of 150 feet. It is therefore not necessary to establish an excessively high limit in order to avoid unfair discrimination between existing and prospective buildings. A 150-foot height limit will be fair to both. Thirdly, there is the matter of light and ventilation.

Of the 125-foot height districts there is also but one. This is a district in the meadows which appears susceptible of a large warehouse terminal development but which does not require a greater height than ten stories.

The 80-foot height districts embrace the great bulk of the industrial areas in the city as well as those apartment house areas which are most available for the erection of six and seven story buildings.

The 50-foot height districts contain those areas which seem to be destined for three and four-story apartments.

The 35-foot height districts are confined to those neighborhoods that should be protected so far as possible for one and two-family houses.

*Towers.*—To absolutely prohibit the erection of towers in Newark, it was felt, would be a mistake. They lend variety to the skyline and embellish a city as few structures do. A single Woolworth tower instills more civic pride than a hundred giant skyscrapers occupying the entire lot. If sufficiently numerous, towers might conceivably obstruct the light and ventilation of neighboring buildings, but when they are suitably located and surrounded by adequate open space the objection to them on this score is reduced to a minimum. Moreover, it is not to be expected that they will ever be erected in great numbers. Their cost of construction renders this improbable.

The proposed zoning ordinance, therefore, permits towers of any height subject to two conditions: (1) that they occupy no more than 25 per cent of the lot area; and (2) that an open space be provided, above the height limit fixed for building in the district, on each and every lot line that is not also a street line. In other words, towers are allowed on the street line but not on the property line. The width of the open space that must be left on the lot lines is proportioned in each case to the height of the tower above the height limit established for ordinary buildings in the district.

*(To be concluded.)*

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* This is on the assumption that the size of the glass surface in the window is thirty-two inches wide and sixty-one and one-half inches high, the opening between the stop beads being thirty-six by sixty-six inches. The walls in which the windows are set are assumed to have a thickness of eight inches.

# DISINFECTION OF SEWAGE.*

## Results Obtained at Millville and at Camp Merritt by the Use of Chlorine Gas—Tests Made by State Department of Health.

By CHESTER G. WIGLEY.†

In the state of New Jersey, many municipalities have been required to sterilize the sewage because of the fact that the area in which shell fish are grown or where people bathe, or streams from which people derive water-supplies, would otherwise be seriously and often disastrously polluted. The results of such disinfection have in general been very satisfactory, but depend primarily upon the person operating the plant, who must be conscientious and painstaking in the performance of his duties.

The purpose of this paper is to give the results obtained when disinfecting the sewage at one or two places in that State.

At the city of Millville, N. J. a sewage treatment plant had been constructed consisting of settling basins, an aerating basin, contact beds and tidal storage basin. Because of the increase in the flow of sewage and backing up of the tide into the contact beds the results obtained had seldom been satisfactory. The effluent from the plant was discharged into the Maurice river which is used about twelve miles below the city for the floating of shell fish. The poor quality of the effluent resulted in complaints being made to the State Department of Health by people operating the shell fisheries, as they were threatened with loss of business because of the pollution of the floating areas. The city, because of a recent program of municipal improvements, had very nearly reached its bonded indebtedness limit and the municipal officials stated that it was impossible for them to extend the existing works, providing adequate capacity for proper treatment of the sewage in the existing type of plant. Some tests made by the State Department of Health of New Jersey had before this time demonstrated the possibility of obtaining a satisfactory effluent by the use of chlorine gas as a disinfecting agent.

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*From "The Cornell Civil Engineer" for October, 1919, somewhat condensed.

†Formerly chief engineer of the State Board of Health of New Jersey; now with Wallace & Tiernan Co.

The results obtained during these tests rae given in the accompanying table:

Results Obtained When Disinfecting the Sewage of the City of Millville, N. J., with Chlorine Gas, August 3, 4 and 5, 1916. Bacteria per C. C. 37°

| | Before Treatment | | | After Treatment | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| P. P. M. Cl. in eff. | Total | Red Colonies | B. Coli | Total | % Reduction | Red | % Reduction | B. Coli | % Reduction |
| 3.7 | 150,000 | 100,000 | 0.00001 | 1,000 | 99+ | Less than 1000 | 99+ | .001 | 99 |
| 3.7 | 400,000 | 150,000 | 0.00001 | 45,000 | 89 | 20,000 | 87 | .001 | 99 |
| 3.7 | 300,000 | 220,000 | 0.000001 | 7,000 | 98 | 3,000 | 98+ | .001 | 99.9 |
| 4.2 | 210,000 | 100,000 | 0.00001 | 4,000 | 98 | 1,000 | 99 | .01 | 99. |
| 4.2 | 180,000 | 110,000 | 0.00001 | 7,000 | 90 | Less than 1000 | 99+ | .01 | 99.9 |
| 5.8 | 40,000 | 40,000 | 0.0001 | 2,000 | 95 | Less than 1000 | 98 | .1 | 99.9 |
| 5.8 | 300,000 | 200,000 | 0.000001 | Less than 1000 | 99.9 | Less than 1000 | 99.9 | .01 | 99.9 |
| 6.3 | 150,000 | 100,000 | 0.0001 | 1,000 | 99+ | Less than 1000 | 99+ | .1 | 99.9 |
| 6.3 | 200,000 | 130,000 | 0.0001 | Less than 1000 | 99+ | Less than 1000 | 99+ | .1 | 99.9 |
| 6.3 | 220,000 | 170,000 | 0.00001 | Less than 1000 | 99+ | Less than 1000 | 99+ | .1 | 99.9 |
| 7.1 | 290,000 | 80,000 | 0.00001 | 300 | 99.9 | Less than 1000 | 99+ | .01 | 99.9 |
| 7.1 | 370,000 | 190,000 | 0.00001 | 900 | 99.7 | 300 | 99.8 | .1 | 99.9 |

It was therefore finally decided that the most economical and expeditious precedure was for the city of Millville to provide proper equipment for the sterilization of the sewage, with laboratory facilities and a qualified man in charge of the laboratory to make daily tests of the effluent. Before proceeding to give the results of this treatment it will be advantageous to give a brief survey of the conditions at the city relative to the sewage disposal works.

The city of Millville, N. J. had a population of over 13, 000, the town being situated in the southern portion of New Jersey, and the surface of the ground being gently sloping towards the Maurice river. The grades of the sanitary sewer system are mostly low. The daily sewage flow, from measurements made by means of a weir placed at the outlet of a settling basin, averaged 1,300,000 gallons per day; the maximum rate of flow being 1,350,000 per day. As the sewage from the city flows through a long trunk sewer before reaching the settling basins and as it is known that there is considerable leakage into the sewerage system, it is probable that these conditions account for the small variation between the average and maximum flows.

In the remodeled plant the contact beds and tidal basins were practically abandoned, being of very little value in treating the daily flow of sewage. The disinfecting apparatus was arranged so as to disinfect the settled sewage in the aerating chamber, permitting about ten to fifteen minutes contact after the addition of the chlorine until it was discharged into the outlet. The apparatus used was the manual control, direct feed chlorinator as manufactured by the Wallace and Tiernan Company.

The sedimentation tanks are four in number, each compartment having the following dimensions along and to the water surface: Length, 76 ft. 6 in.; width, 15 ft. 6 in.; depth, 6 ft. 0 in. The tanks contain no baffles, with the exception of shallow surface boards. The sewage enters each compartment through two pipes at the water elevation.

The results of the treatment, supplied to the writer by Newton C. Wade, city engineer of Millville, show that, with few exceptions, since the remodeling of the plant and the use of disinfecting agents the bacterial removal has been adequate for the protection of the shell fish for the months of March, April, May, June, July and part of August, 1918. [The author gave a table showing the result for 57 days during this period. From this it appears that, using about 4 parts per million of chlorine, the reduction of B. Coli ranged from 90% to 97.5%, and those determined on agar plates from 81% to 97.7; using about 5 parts, the reduction was—B. Coli, from 87% to 97%; agar plates, 96.4% to 99.1%; using about 6 parts—B. Coli, from 80% to 99.5%; using about 7 parts,—B. Coli from 90% to 100%, agar plates, 98.3% to 99.9%. The number of B. Coli in the treated effluent ranged from 0 to 1,000 per c. c., averaging 303; and the number on the agar plates ranged from 525 to 52,000, averaging 9,340. The average reduction of B. Coli was 94.7%, and by agar plate determination, 97.7%.]

There are also given below the results obtained when disinfecting the sewage of Comp Merritt, N. J., by means of liquid chlorine, which results have been kindly supplied by Captain Paul Molitor.

These results are interesting in showing a comparison between the B. Coli contained in the river water 500 feet above the sewer outlet and 500 feet below the sewer outlet.

Bacterial Examinations of Samples of Sewage and River Water from Camp Merritt Disposal Works. Laboratories of Hackinsack Water Co.

| Date | Bacteria per C. C. | | 48 hour count gelatine at 20° | | B. Coli | | In .001 C. C. innoculation. | |
|---|---|---|---|---|---|---|---|---|
| | Raw sewage | Final effluent | River water 500 ft. up stream from outlet | River water 500 ft. down stream from outlet | Raw sewage | Final effluent | River water 500 ft. up stream from outlet | River water 500 ft. down stream from outlet |
| 12-19-18 | | | 870,000 | 1,300,000 | Present | Present | Present | Present |
| 12-26-18 | 1,410,000 | 120,000 | 90,000 | 200,000 | Present | Present | Present | Present |
| 12-31-18 | 1,240,000 | 10,000 | 20,000 | 40,000 | Present | Absent | Present | Present |
| 1-2-19 | 880,000 | 40,000 | 100,000 | 84,000 | Present | Present | Present | Present |
| 1-7-19 | 1,000,000 | 313,000 | 9,000 | 129,500 | Present | Present | Absent | Present |
| 1-21-19 | 970,000 | 20,000 | 170,000 | 40,000 | Present | Present | Present | Present |
| 1-28-19 | 1,040,000 | 18,000 | 5,000 | 8,000 | Present | Present | Absent | Absent |
| 2-4-19 | 1,860,000 | 1,000 | 1,400 | 3,500 | Present | Absent | Present | Present |
| 2-11-19 | 2,640,000 | 7,000 | 20,000 | 48,500 | Present | Present | Present | Present |
| 2-18-19 | 1,550,000 | 4,000 | 4,500 | 4,950 | Present | Absent | Present | Absent |
| 2-26-19 | 1,880,000 | 1,500 | 46,000 | 55,000 | Present | Absent | Absent | Present |
| 3-4-19 | 1,590,000 | 500 | 4,000 | 1,300 | Present | Absent | Absent | Absent |
| 3-11-19 | 1,530,000 | 400 | 2,000 | 3,000 | Present | Absent | Absent | Absent |
| 3-18-19 | 1,770,000 | 1,550 | 1,900 | 1,200 | Present | Absent | Present | Absent |
| 3-25-19 | 1,960,000 | 850 | 2,350 | 2,400 | Present | Absent | Absent | Absent |

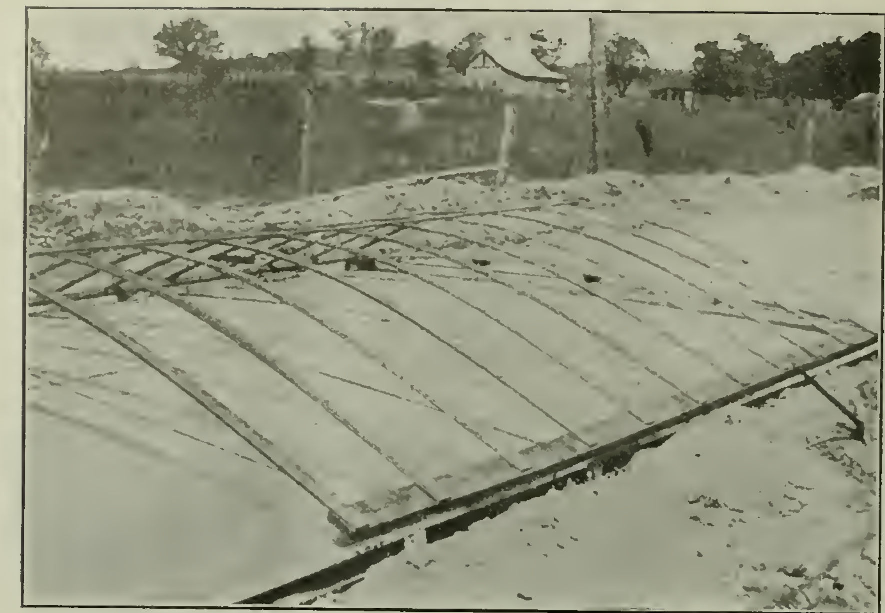
River water samples were taken from tide water below dams of Hackensack Water Co. G. R. Spalding, Bacteriologist.

In all cases where sewage sterilization plants are installed, it is well to bear in mind that the amount of chlorine to be used can only be satisfactorily determined by actual tests made upon the sewage to be treated, as the amount of chlorine required for sewages of different character varies through very wide limits.

## PROTECTING CONCRETE PAVEMENTS DURING SETTING.

A light, portable frame to be used in protecting concrete pavements immediately after construction has been devised by G. J. Lynch, of Reagan & Lynch, contractors, of Uniontown, Pa. This can easily be consturcted at small expense by any contractor, using materials readily obtainable.

The protecting material is canvas, as in most of such devices, the novel feature being the frame which supports it. This consists of a series of ribs of one by four-inch boards, spaced two feet apart, their ends nailed to two by six-inch longitudinal runners. A one by four-inch continous strip of wood was nailed to the centers of the ribs to keep them at uniform spacing. A sawhorse three or four feet high was set



FRAME TO SUPPORT CANVAS, FOR PROTECTING CONCRETE DURING PERIOD OF HARDENING.

in the center of a completed stretch or road, the ribs laid across this, their ends bent down until they touched the sides of the road, and fastened in this position by a bowstring of wire attached to the longitudinal runners. Another short piece of wire was stretched vertically between the center of each of these wires and central top strip.

The work of attaching these wires was performed as follows:

The wire was attached to one side by winding it around a cleat securely nailed in place. In order to spring the other side into position, a crowbar was used. The wire was wrapped around a cleat and then attached to the bar, which was used as a lever until the wire was taut enough and the cleat had been nailed down. This was continued until all horizontal wires had been placed. Cleats 2 by 6 by 12 inches were placed under the side braces at intervals of 4 feet, to facilitate handling. Eight of these supports were made in units 25 feet long.

Before these frames were used, eight men and a foreman worked an hour in shifting 200 feet of canvas. With these frames, the shifting is done in 15 minutes; the cost of the former, three shifts a day, being $11.40, and of the latter, $2.85; or costs per square yard of 1.9 cents and 0.475 cent respectively. The total cost of 200 feet of frames was $78 for material and $24 for labor. The frames therefore paid for themselves when 7160 sq. ft. of pavement had been laid.

# FOUNDATIONS FOR PAVEMENTS

## Macadam Base Preferable to Cement Concrete for Brick, Bituminous Concrete and Other Kinds of Wearing Surface—Opinions of Four Speakers at the A. S. M. I. Convention.

Four of the authors of papers discussing paving matters which were presented before the American Society for Municipal Improvements at New Orleans expressed the opinion, either directly or indirectly, that under certain conditions a cement concrete base not only was not necessarily the best for a given pavement, but might even be less desirable than a less rigid base such as bituminous concrete or macadam.

One of the papers referred to was written with the purpose of expressing this opinion, this being one by George C. Warren entitled "Foundations for Warrenite-Bitulithic Pavements and Roads." Another, by Will P. Blair, treating of the "Economy of Brick Street and Road Construction," introduced the same idea as one of its principal features; Major E. A. Kingsley, in discussing "Roads in France and America," laid emphasis on the same point; while Frederick A. Reimer, county engineer of Essex county, New Jersey, in presenting traffic records covering four years taken on a number of roads in that county, illustrated by certain of these records the satisfactoriness of such foundations. The several papers and parts of papers referred to are abstracted in the following paragraphs.

Mr. Blair said that out of a study of the action of brick pavements had "grown the belief that a rolled broken-stone base will so perform a drainage function as to stabilize soil support and at the same time afford sufficient voids that frozen moisture content will cause but little expansive force," and therefore that a broken stone base practically eliminates the injury from frost action that is occasioned by such action even when cement concrete bases are used. "An added assurance against injury is the employment of an asphalt filler, which possesses qualities of adhesion and cohesion sufficient to hold the brick in place and yet afford a yielding quality which results in an adjustment and re-adjustment following any expansive force. Therefore, a combination of the two—a rolled broken-stone base and an asphalt filler—protects against injurious effects in a most wonderful way. These qualities, thoroughly understood, combine an element of economy so great that it may be regarded as real progress in economy of brick road construction."

Major Kingsley said in his paper: "The Tillson-Lewis report reads: 'Happily, most of the French roads will make excellent foundations to which it will be sufficient to apply appropriate wearing surfaces.' No hint or suggestion is made as to tearing up the old macadam that it may be replaced with an expensive foundation for the 'appropriate wearing surfaces.' No more is there necessity in very many instances in our own country for tearing up well-built gravel, water-bound macadam, or even bituminous surface-treated macadam to put in new foundations. Thousands of dollars per mile upon thousand of miles of thoroughfares can be saved to the property owners by intelligent use instead of destruction of the work already done and the expenditure already made.

"The writer, to conserve a fast disappearing city bank balance, in 1916 paved several streets in San Antonio, Tex., by using as foundations old macadam roads. The macadam was made perfect in surface, after which a two-inch asphaltic pavement was laid. No defects have been noted in any of this work and much pavement in San Antonio has since been laid in the same manner. Some of the older of these pavements are in the down-town district and subjected to considerable heavy traffic. . . .

"Cement concrete is not desirable nor required where a macadam road is built and will answer for foundation purposes And yet there are many cases where the macadam will not answer and concrete foundations should be used. . . . $800,000,000, it is estimated, has already been spent in the United States on water-bound macadam and gravel construction. . . . The hundreds of millions saved by utilizing good macadam for foundations will build thousands of miles of additional roads."

Mr. Reimer, in presenting traffic data collected on Essex county roads, reduced the traffic total tonnage to tons per foot of width and tons per foot using the ten-foot strip on each side of the trolley track, each of these being given for each of the years 1916, 1917, 1918, and 1919. The pavements where the traffic records were taken consisted in two cases of 2½-inch bituminous concrete on a 6-inch concrete base, in two cases of 5-inch granite block on a 6-inch concrete base, in one case of asphalt block on a 6-inch concrete base, in one case of 2½-inch bituminous concrete on a 9½-inch telford macadam base, and in the seventh case of 2-inch bituminous concrete on a 9½-inch telford macadam base.

The first of the two on telford base had a double trolley track in the center, and in 1919 the tons traffic using the ten-foot strips outside of the track was 507.54 per footh width for the year, while the highest tonnage similarly calculated for any of the roads on a concrete base was 391.17. The second of the two roads on telford base had a 24-foot roadway and the travel over it was comparatively light, amounting to 86 tons per foot of width in 1919. Of the former of these two roads on telford base, which carried a much heavier traffic than any other road in the list, Mr. Reimer reported: "There is absolutely no evidence of this pavement creeping under the traffic carried in 1919," while the two pavements with 2½-inch bituminous concrete on a 6-inch concrete base "have shown a marked tendency to creep under the large increase of traffic using same." Concerning the other pavement made of bituminous concrete on a telford base, but carrying a much lighter traffic, Mr. Reimer reported that it "is apparently in more perfect condition today than four years ago."

From his experience he concludes that "given an old telford macadam foundation from eight to ten inches in thickness, with the subsoil thoroughly drained, a bituminous concrete surface not less than two inches in thickness will economically carry both light and medium traffic." Light traffic he defines as not exceeding 150 tons per foot of width of roadway travel, with the combined weight of vehicle and load not exceeding fifteen tons; while medium traffic would lie between 150 and 300 tons per foot of width of roadway travel, with the same limit of combined weight of vehicle and load.

Mr. Warren went into the subject much more exhaustively, devoting his entire paper to it, and some of the principal points which he made are as follows.

The essential requirements of a pavement foundation are resiliency and strength. These may be mutually exclusive and the engineer must adjust a compromise between them depending upon the requirements of each particular road. Only less important is a union between the base and the surface as close as is practicable with due consideration to the other factors.

Strength Mr. Warren considers less important than resiliency; in fact, he believes that "extreme strength of foundation, which necessarily includes rigidity, is actually detrimental under many if not most conditions of subsoil and drainage."

Resiliency can be given first place where the natural or artificial drainage is adequate and the subsoil is of such character that it can be rolled to a reasonably solid condition, and where the wearing surface is a stable, monolithic, resilient pavement. "On the other hand, if a road or pavement subbase is in poorly drained or weak subsoil, strength of base with its attendant evil of rigidity is a controlling factor for consideration."

The highest degree of tensile strength and its attendant rigidity necessarily carry with them the certainty of more or less cracking from contraction and heaving from expansion under climatic changes. Serious cracks in a pavement foundation will cause corresponding cracks in the wearing surface. The cracking is immediately followed by serious wearing of the edges of the cracks under normal traffic.

If we want to break a surface with the blow of a hammer, we would place it on a rigid, solid stone or anvil, knowing that if we should place the substance on a piece of rubber (which is the acme of resiliency) the blow would have no effect whatever. So in a pavement surface, if other conditions, including drainage, subsoil and character of wearing surface, make the use of a resilient base practicable, then the wear and tear on the wearing surface under the blows of traffic are vastly less than if laid on a rigid base.

### OLD MACADAM AS BASE.

Macadam roads, whether of crushed stone, gravel, slag or oyster shells, are resilient and still solid enough to hold the *weight* of traffic, as distinguished from the *motion* of traffic. There are in existence today macadam roads costing millions of dollars which, as a wearing surface, would not sustain the traffic of modern motor vehicles, but which if not removed would provide an economic base either in whole or, if worn too thin, with proper surface addition of new metal.

Mr. Warren reports that in his experience this has been demonstrated by fifteen years of successful results in more than one hundred municipalities and under all the widely varying climatic conditions of the United States and Canada, such use amounting to over 8,000,000 square yards. He cites as instances Highland avenue, Birmingham, Ala., laid in 1904; Michigan boulevard, Chicago, laid in 1907; Columbia River highway, Oregon, laid in 1915, and others. On Michigan boulevard a traffic record taken August 16, 1907, gave a total number of vehicles of 2,908, which had increased to 20,204 on September 2, 1919. (It is interesting to note that in 1907 there were 1,024 horsedrawn vehicles, while the 1919 record gives only 25.)

Where an old macadam surface is so used, it should be disturbed as little as possible, which may be effected by humoring the grade and as closely as practicable following the old established grade, merely knocking off the humps and using the material to fill the depressions. On country roads particularly, regardless of the type of old construction or of new foundation or wearing surface, the best practice is merely to level off and build up on the old grade. On country roads raising the grade a few inches not only does no harm but may improve the drainage at reduced cost of construction.

"It should be borne in mind that the integrity of the old road bed should be carefully proved by test holes or still better by test trenches across the road at frequent intervals. If such test develops a depth of say six inches or more of well compacted crushed stone, gravel, slag or oyster shells, with the coarse aggregate predominating, it is safe to say that the foundation is adequate for such a stable, dense monolithic water-proof surface as we are discussing. If such tests show a deficiency of such old metal, then there is still enough of any old material to make its conservation most economic for reinforcing by the addition of a more or less varying depth of new metal."

### NEW BROKEN STONE BASE.

Mr. Warren also advocates building new base of broken stone, emphasizing the importance of drainage and compression of the subgrade. "With a well-drained, well compacted subgrade, there need be no question of the sufficiency of a well-laid, compressed stone base, under most traffic and climatic conditions."

"It is desirable that the lower portions of the base be of as large stone as local conditions permit. If crushed stone is used, it is desirable that the largest particles be as large as three or four inches in diameter. If economically available, it is desirable to lay a lower course of quarry or filled stone, preferably slabs, about four inches thick, laid on the flat side. . . . The large stone should be supplemented by the laying of a sufficient quantity of new smaller stone to provide the desired depth and contour, and the whole compressed with a heavy roller until a sound base, which will not creep or compress under further rolling, is provided. Under the extremely heavy traffic of war conditions in France and Belgium, it was found that rather flat stone as a lower course and a total of eight to nine inches of metal would sustain the *weight* of the immense motor truck and artillery traffic, but without an addiional substantial wearing surface it would not long sustain the *motion* of traffic."

This type of base with warrenite-bitulithic surface has been used successfully for over 12,000,000 square yards during the past eighteen years, and over 3,000,000 had been under construction and contract in 1919. Some of this may be found in nearly every city and county of Oregon, 2,000,000 square yards having been laid in Portland since 1903. All of this type of pavement that has been laid in Oregon is on what Mr. Warren calls "resilient base"—either old macadam, new compressed stone, or dense bituminous concrete. In Salt Lake City and other parts of Utah there are over 200,000 square yards, part of this having a base composed of iron furnace slag in place of crushed stone. The celebrated Orange Grove avenue in Pasadena was laid on a compressed stone base nine years ago, has had no repairs in the meantime, and the contom is still in perfect condition.

### BITUMINOUS CONCRETE BASE.

Dense bituminous concrete has been used by Mr. Warren during the past seven years for over 3,000,000 square yards of povement in more than fifty municipalities, and he claims that there is no type of foundation which as a whole has resulted in so nearly absolutely and uniformly successful results. This he attributes to the fact that, in addition to the resiliency of he macadam base, the bituminous surface unites perfectly with the bituminous base because both courses are of the same character, and there is therefore no possibility of the displacement of the surface. The total depth of base and wearing surface ranges from four to five inches.

In the far west, where bituminous materials are comparatively cheap and where clean, sound gravel is economically avaialble, such construction has been made at lower cost than is possible with an adequate depth of rigid portland cement concrete base. In the east, however, under the past low prices of cement, cement concrete base has had the advantage in the first cost, and consequently very little bituminous concrete base has been laid in the east. Under the present uniformly high cost of portland cement, however, in many if not most places the dense bituminous concrete base construction is now generally as low as if not lower than the portland cement concrete base. This type of base has been used in Oregon, California, Arizona, Idaho, Utah, Montana, Washington, Wyoming and British Columbia. The U. S. Army Department and the U. S. Bureau of Public Roads adopted dense bituminous concrete base on all of the principal roads of Camp Lewis, Washington, totaling about 500,0000 square yards. The wearing surface was warrenite-bitulithic and local bank gravel was used for both wearing surface and base, and Mr. Warren claims that no cantonment roads of any type whatever have proved so uniformly successful under the vigorous traffic of army cantonments as these roads in Camp Lewis.

## NEW SAN FRANCISCO STREET SIGNS.

San Francisco needs more and better street name signs, and, with a view to meeting this need, the Engineering Department turned over to one of its employes, R. S. Woodward, the work of designing a sign for general use. The sign which he evolved is shown in the accompanying illustrations.

NEW STREET SIGNS IN SAN FRANCISCO.

At each street corner where will be two double-faced signs, one for each street. Each sign consists of a strip of Armco steel 20 by 4 inches. This is given one paint coat and two base coats, and the letters are put on with two coats. The base color is yellow and the letters black; yellow being striking because few surrounding colors are yellow, while black contrasts strongly with the yellow background. The signs are set about 9 feet above the ground.

Most of the signs are on a standard made of four feet of three-inch pipe, a reducer, and six feet of two-inch pipe. The bottom is set one foot into a concrete base. The three-inch pipe is painted black, the smaller pipe yellow, and the cap black. For fastening the sign to the standard, a piece of angle iron is brazed in a horizontal position onto a cap which screws onto the top of the standard. There are two holes in this angle iron and corresponding ones in the bottom of the sign, and short bolts fasten the sign to the angle. The second sign is fastened on top of the first in the same way, by means of an angle iron bolted to the top of the lower sign, another to the bottom of the upper sign, and these two angle irons being brazed together. Ordinarily the signs are fixed at right angles to each other, but where the streets intersect at a different angle, the angle irons are brazed together at the same angle.

In some cases the signs may be fastened to existing wooden telegraph or trolley poles, when a bracket will be used to hold them out from the pole so that they can be seen in both directions. Such a bracket is shown by one of the photographs.

## PAINTING IRON AND STEEL STANDPIPES.

### Information from All Sections of the Country—Kind, Amount and Cost of Paint Used—Preparatory Treatment—Results.

A paper on this subject by Charles W. Sherman was published in our issue of November 1, in which reference was made to data collected and tabulated by him. These data are given in the accompanying tables.

Several cities contained in the author's table have been omitted because the information given was incomplete. These were as follows:

Amityville, N. Y.; constructed 1892; iron; 20 by 125 ft.; no tower or roof; ground water; painted 2 coats when erected; in 1914 painted for 51 ft. down from top, wire brushed, one coat of graphite.

Brookville, Pa.; two constructed about 1894; steel (?); 20 by 24 ft.; tower, no roof; surface water, filtered, with alum and hypo.; not painted since erection. Also two erected in 1902; steel, 20 by 24 ft.; tower, no roof; same water; not painted since.

Canton, N. Y.;: Constructed 1889; steel; 20 by 72 ft.: no tower or roof; soft surface water; "do not paint interior."

Circleville, O.: Constructed 1886; iron: 22 by 150 ft.; no tower or roof; hard water; nothing about painting known to present authorities.

Conneaut, O.: Constructed 1888: iron: 20 by 120 ft.: no tower or roof; soft water, filtered, with alum; no record of interior painting; outside painted 1888, 1902, 1915, 1916, one coat each time.

Dayton, O.: Constructed 1913; steel; 41 by 85 ft.; roof, no tower; hard ground water; not painted since construction and kind used then not stated.

Fall River, Mass.: In addition to data given, first standpipe painted in 1889, 1893, 1900 and 1903; no data given.

Hamilton, N. Y.: Constructed 1895; iron; 30 by 38 ft.; tower, no roof; ground water, medium, filtered; no data as to painting.

Knoxville, Tenn.: Constructed 1894; steel; 32 by 85 ft.; painted in 1900 with "various kinds."

Manchester, Mass.: Constructed 1892; 35 by 75 ft.; roofed; painted in 1894 with ebonized varnish.

Mattapoisett, Mass.: Constructed 1913; iron (?); 25 by 90 ft.; roof, no tower; soft ground water; when constructed given two coats, material not known.

Merrimac, Mass.: Constructed 1904; 40 by 45 ft.; roof; painted 1904, 1905, 1906 and 1910; no data.

Millville, N. J.: Constructed 1878; iron; 12 by 128 ft.; no tower or roof; no data known.

Spokane, Wash.: second tank constructed 1908; steel; 30 by 70 ft.; no tower or roof; hard ground water; kind of paint not stated.

*(To be continued.)*

| Place. | Date of Construction. | Material. | DIMENSIONS. Diam. Ft. | Height. Ft. | Character of Water. |
|---|---|---|---|---|---|
| Asbury Park, N. Y. | 1888 | Iron | 12 | 125 | Ground |
| Atlantic City, N. J. | 1882 | Iron | 25 | 132 | Ground and surface; soft |
| Atlantic City, N. J. | 1888 | Iron | 15 | 140 | Ground and surface; soft |
| Baldwinsville, N. Y. | 1889 | Iron | 20 | 50 | Ground; hard |
| Baltimore, Md. | | | | | |
| Roland | 1905 | Steel—tr | 24 | 92.5 | Surface: soft; filtered and alum |
| Arlington | 1898 | Steel—tr | 25 | 95 | Surface; soft; filtered and alum |
| Bangor, Me. | 1896 | Steel—tr | 75 | 50 | Filtered and alum |
| Barnegat, N. J. | 1909 | Steel—tr | 20 | 20 | Artesian; soft |
| Belfast, Me. | 1887 | Iron | 30 | 45 | Filter and soda and alum |
| Belmar, N. J. | 1908 | Iron | 18 | 125 | Artesian; soft |
| Biddeford, Me. | 1906 | Steel | 60 | 50 | Soft; filtered and alum |
| Billerica, Mass. | 1898 | Iron—r | 25 | 118 | ............................ |
| Boston (Metrop. W. W. | | | | | |
| Forbes Hill | 1902 | Steel—tr | 30 | 64.3 | Surface; soft |
| Arlington | 1894 | Iron—r | 40 | 60 | Surface; soft |
| Bellevue | 1914 | Steel—tr | 100 | 44.3 | Surface; soft |
| Brewer, Me. | 1904 | Steel | 30 | 106 | Surface; sand filter |
| Bridgton, Me. | 1903 | Steel | 35 | 55 | Soft |
| Briston, Conn. | 1901 | Steel | 30 | 35 | Surface; soft |
| Bristol, R. I. | 1908 | Steel—r | 40 | 50 | Ground; filtered and alum and |
| Brockport, N. Y. | abt. 1891 | Steel | 20 | 75 | soda; Ground; hard |
| Brockton, Mass. | 1890 | Iron? | 62 | 60 | ............................ |
| Burlington, N. J. | 1887 | Iron | 20 | 120 | River; filtered & alum & hypo. |
| Cape May | 1902 | Steel—r | 25 | 135 | Artesian; hard |
| Carthage, N. Y. | 1887 | Iron | 25 | 75 | Soft; spring |
| Cortland, N. Y. | 1911 | Ingot iron | 60 | 50 | Hard |
| Dayton, Ohio | 1916 | Steel—r | 42 | 90 | Ground; hard |
| Delaware, Ohio | 1888 | Iron | 20 | 100 | Ground; med. |
| Duluth, Minn. | 1913 | Steel—r | 22 | 27 | Ground: soft |
| | 1914 | Steel—r | 22 | 27 | Surface; soft, hypo. |
| Eagles Mere, Pa. | 1902 | Steel—r | 11-5/12 | 100 | Surface; soft |
| Elmer, N. J. | 1912 | Steel | 12 | 110 | Soft; "best in state" |
| Exter, N. H. | 1886 | ....... | 52 | 60 | ............................ |
| Fairport, N. Y. | 1893 | Steel | 26 | 75 | Hard |
| Fall River, Mass. | 1886 | Iron | 73 x 34 | | Med.; surface |
| | 1892 | ....... | 65 x 56 | | ............................ |
| Falmouth, Mass. | 1903 | Iron—r | 35 | 30 | Surface; soft |
| | 1892 | Iron | 20 | 85 | Surface; soft |
| Fostoria, Ohio | 1891 | Steel—t | 25 | 100 | Surface; soft; filtered |
| Foxborough, Mass. | 1891 | Iron—r | 20 | 125 | Ground |
| Framingham, Mass. | abt 1890 | ....... | 40 | 81 | Mixed |
| Franklin, Mass. | 1886 | Iron | 37 | 80 | Ground; hard |
| Grand Rapids, Mich. | 1907 | Steel—tr | 50 | 60 | Filtered ;alum and hypo. |
| Highlands, N. J. | 1907 | Steel | 30 | 30 | Soft; filtered |
| Hingham, Mass. | 1883 | Iron—r | 40 | 57 | ............................ |
| | 1912 | Steel | 20 | 75 | ............................ |
| Hyannis, Mass. | 1912 | Steel—r | 25 | 100 | Ground; soft |
| Jackson, Ohio | 1900 | Iron | 30 | 50 | Ground |
| Jamesburg, N. J. | 1909 | Steel? | 16 | 65 | ............................ |
| Jenkintown, Pa. | 1907 | Wrought Iron?—r | 28 | 127 | ............................ |
| | 1912 | Wrought Iron?—r | 60 | 65 | Filtered and alum and hypo. |
| Lancaster, Pa. | ? | Steel | 25 | 110 | Filtered: chlorine & alum |
| Lewisburg, Pa. | 1897 | Iron | 15 | 130 | ............................ |
| Marion, Mass. | 1907 | ....... | 20 | 100 | ............................ |
| Marlboro, Mass. (to 1912 only) | 1895 | Iron—r | 30 | 35 | Surface |
| Matawan, N. J. | 1903 | Steel—r | 12 | 115 | Soft: filtered |
| Medford, N. J. | 1893 | Iron | 12 | 100 | ............................ |
| Media, Pa. | 1898 | Iron | 35 | 35 | Surface; soft; filtered; cl., alum |
| Middleboro, Mass. | 1885 | Iron—r | 20 | 103 | ............................ |
| Millis, Mass. | 1891 | Iron | 20? | 100 | Hard |
| Milwaukee, Wis. | 1886 | Steel?—t | 15 | 173 | Surface: hard; cl. |
| | 1874 | Steel?—t | 4 | 125 | Surface: hard; cl. |
| Minneapolis, Minn. | 1910 | Steel—tr | 26 | 55 | River; hard; filtered; cl.; alum |
| | 1893 | Steel—tr | 22 | 45 | ............................ |
| Montclair, N. J. | 1887 | Steel | 40 | 30 | Alum; chlorine |
| Nantucket, Mass. | 1878 | Iron | 24 | 15 | Surface; soft |
| | 1908 | Steel | 30 | 80 | ............................ |
| Narrangansett Pier, R. I. | 1888 | Iron | 30 | 70 | Surface; soft |
| Needham, Mass. | 1891 | Iron—r | 25 | 85 | ............................ |
| New London, Conn. | 1889 | Iron | 25 | 26 | Surface; soft |
| New York City— | | | | | |
| Richmond Borough | 1911 | Steel | 20 | 100 | Ground; hard |
| | 1897 | Steel | 20 | 60 | Ground; hard |
| North Attleboro, Mass. | 1881 | Iron—r | 40 | 60 | Ground; soft |
| Norwood, Ohio | 1884 | Iron—r | 40 | 60 | Artesian |
| Oak Bluffs, Mass. | 1890 | Iron | 20 | 70 | ............................ |
| Old Orchard, Me. | 1909 | Steel | 33 | 105 | Soft; filtered; alum |
| Onset, Mass. | 1894 | Steel | 20 | 40 | Surface; soft |
| Ossining, N. Y. | 1889 | Iron—tr | 24 | 30 | Surface; soft; cl. |
| Palatka, Fla. | 1887 | ....... | 25 | 50 | ............................ |
| Paris, Ky. | 1891 | ....... | 25 | 86 | ............................ |
| Perry, N. Y. | 1895 | Steel—r | 15 | 75 | Lake; soft |
| Philadelphia, Pa. | 1900 | Steel | 11 | 150 | River; filt.; cl. |
| | 1882 | Iron | 5 | 153 | River; filt.; cl. |
| | 1900 | Steel | 11 | 150 | River; filt.; cl. |
| Plainville, Mass. | 1909 | Steel—r | 25 | 67.3 | Ground; hard |
| Portland, Me. (3 standpipes) | | ....... | ...... | | ............................ |
| Portland, Ore. | 1909 | Steel | 16 | 40 | Surface; soft |
| | 1890 | Iron? | 25 | 100 | Surface; soft |
| | 1912 | Steel | 18 | 61 | Surface; soft |
| Putnam, Conn. | 1885 | Iron | 30 | 45 | Surface; soft; filtered |
| Rahway, N. J. | 1906 | Steel | 25 | 125 | Surface; soft; filtered and alum and chlorine |
| Reading, Mass | 1890 | Iron—r | 30 | 100 | Ground; hard; filtered; lime; alum |
| Rockville, Conn. | 1899 | Steel | 30 | 60 | Ground; soft |
| Rutland, Mass. | 1896 | Iron | 20 | 96 | Surface; soft |
| St. Louis, Mo. | 1868-70 | Iron—tr | 5 | 160 | Surface |
| | 1886 | Iron—tr | 6 | 160 | Surface; filtered; lime; sulph. Iron, alum, chlorine |
| | 1898 | Steel—tr | 6 | 140 | do. |
| | 1908 | Steel—r | 30 | 34.8 | do. |
| Sewickley, Pa. | 1901 | Steel | 20 | 110 | Surface; hard; hypo. |
| Spencer, Mass. | 1899 | Steel | 40 | 39 | Surface; soft |
| Spokane, Wash. | 1904 | Steel | 30 | 70 | Ground; hard |
| Summit, N. J. | 1907 | Steel | 12 | 75 | Ground; hard |
| | 1896 | Iron | 25 | 65 | Ground; hard |
| Syracuse, N. Y. | 1909 | Steel—tr | 66 | 51.3 | Surface; hard |
| Tisbury, Mass. | 1886 | Iron | 20 | 50 | Ground; soft |
| Toledo, Ohio | 1873 | Iron—t | 5 | 224 | Hard; filtered ;sulph. iron; lime; hypo. |
| Tuckahoe, N. Y. (New Rochelle) | 1894 | ....... | 60 | 60 | Surface; cl. |
| Vincennes, Ind. | 1886 | ....... | 22 | 200 | River; filtered; alum |
| Washington, D. C. | 1904 | Steel—tr | 19 | 40 | River; med.; filtered; alum |
| Waterloo, N. Y. | 1911 | Steel—r | 20 | 40 | ............................ |
| West Orange, N. J. | 1902 | Steel—r | 35 | 35 | Surface; soft; filtered; alum; cl. |
| Westport, Conn. | 1892 | Iron | 25 | 65 | Ground; soft |
| Weymouth, Mass. | 1885 | Iron | 40 | 75 | Surface; soft |
| Winchester, Mass. | 1894 | Steel | 40 | 40 | Surface; soft |
| Winchester, Ky. | 1891 | ....... | 25 | 75 | ............................ |
| Windsor, Conn. | 1916 | Steel | 30 | 105 | Surface; soft |
| Winthrop, Mass. | 1909 | Steel | 40 | 100 | Metropolitan |
| Wolcott, N. Y. | 1912 | Steel | 15 | 85 | Spring; hard |
| Woonsocket, R. I., No. 1 | 1884 | Iron | 50 | 30 | Surface; soft |
| No. 2 | 1889 | Iron | 50 | 35 | ............................ |
| No. 3 | 1891 | Iron | 76 | 30 | ............................ |

t—with enclosing tower. r—with roof. Neither of these present if not so indicated.

October 2 was given up to the sessions of the Elgin organization with a reception to the visiting officials at 5 p. m., after which an auto ride was taken around the Chicago Boulevards. A smoker and grill supper were held in the Auditorium Hotel in the evening.

The forenoon of October 3 was taken for the morning session of the Conference of Street Cleaning Officials. This conference was conducted by W. J. Galligan of the street cleaning department of the city of Chicago and N. Goss, commissioner of public works of St. Paul.

These subjects were under discussion: street flushing; dry sweeping; uniforms; hand-brooming vs. machine sweeping; labor conditions—outlook—unions—wages; co-operation of citizens—litter prevention; co-operation of police; snow removal; garbage collection and disposition; ashes and refuse collection and disposition; oiling of pavements; street openings—temporary care.

Headquarters of the Conference were the La Salle Hotel. An auto trip of inspection of interesting features of the public works department of the city of Chicago occupied Friday afternoon. This trip included a visit to the municipal pier, the garbage disposal plant, the city's repair and store yards, etc. There was a trip to the Elgin factory where Elgin machines and auto-sweepers were seen in the making.

A complete report of the meeting is in preparation and will be mailed to anyone interested on application to Elgin Sales Corporation, 501 Fifth Avenue, New York City.

**The Goodyear Tire & Rubber Co.** employes now have an "Industrial Assembly" consisting off 20 "senators" and 40 "members of the house of representatives" who pass all laws affecting the conduct and welfare of the men. The plan was instituted four months ago and the latest question to be taken up is that of food prices. The Employees' Store Committee of the Industrial Assembly is now buying and selling potatoes under a cooperative plan and other food commodities are being investigated with a view to buying in carload lots.

## PERSONALS

Brown, Linn, has been appointed city engineer of Jefferson City, Mo.

Whelan, Joseph A., Trenton, N. J., has been appointed assistant superintendent of the Michigan State Highway Department, with headquarters at Ann Arbor. He was engaged in road-building in Trenton for some time.

Coleman, Roy D., county engineer for Atchison County, Kansas, for several years, has been appointed Government resident engineer for the Atchison district in the construction of hard-surface roads. Robert Kerr has been appointed county engineer.

Legaré, T. Keith, announces that he has resigned the position of city engineer of Columbia, S. C., and has opened an office in the Hook bldg., Columbia, as consulting engineer specializing in highway and municipal engineering. He will act as district engineer for Dow & Smith, consulting paving engineers, for the Sharman Concrete Pipe Co., and the Legare Templet Co.

## MUNICIPAL INDEX

*(Continued from page 286.)*

Geology of Concrete Aggregates. Editorial in "Concrete and Constructional Engineering," London, July. 2000 words. Engineering and Contracting, Oct. 29, Chicago.

Concreting In Cold Weather Offers Strong Advantages to Owners. By A. E. Wells, pres., Wells Bros. Constr. Co. of Canada, Ltd. 1000 words. Canadian Engineer, Oct. 23, Toronto, Can.

Concreting in Cold Weather. By A. E. Wells, pres. Wells Bros. Constr. Co. 1100 words. Engineering and Contracting, Oct. 22, Chicago.

Concrete and Its Application. Conclusions from laboratory experiments; advice as to proportioning concrete. 800 words. Municipal Engineering and Sanitary Record, Oct. 30, London, Eng.

Concreting Procedure on Miami Flood-Control Dams. Equipment and methods standardized for five separate jobs; standard product secured by test control of varying aggregates. 7 ills., 3200 words. Engineering News-Record, Oct. 2, New York.

Concrete I-Beams Used to Make Crib Retaining Wall. Combined flexibility of wood crib with permanence of concrete; developed on Cleveland railroad for soft ground. 4 ills., 700 words. Engineering News-Record, Oct. 2, New York.

Burnt Earth Concrete, with Iron and Wood Reinforcement. By L. P. Hodge from "Engineering," London, Sept. 5. 1 ill., 1900 words. Engineering and Contracting, Oct. 29, Chicago.

Strengthening Old Bridges by Doubling Up the Trusses. 1 ill., 900 words. Engineering and Contracting, Oct. 22 Chicago.

Load Concentrations on Steel Floor-Joists of Wood Floor Highway Bridges. 5 ills., 1500 words. Engineering and Contracting, Oct. 22, Chicago.

Unusual Design and Joint Details of 430-Foot Bridge. Heat-treated steel eyebars and high-carbon steel built-up members used in Warren-type truss for economy in material. 2 ills., 800 words Engineering News-Record, Oct. 2, New York.

Stress Measurement of Bridges. From "The Engineer," London, Aug. 1 and 8. 1 ill., 4000 words. Engineering and Contracting, Oct. 29, Chicago.

Excavation of New York-New Jersey Vehicular Tunnel. By J. F. Springer. 5 ills., 3000 words. Engineering World, Oct. 15, Chicago.

### MISCELLANEOUS.

Classification and Salaries of Engineers. Toronto engineers adopt schedule of titles, qualifications and minimum salaries for technically-trained men employed by railways, municipalities, industries, public works and large public utilities; salaries range from $1,200 to $12,000 per annum. 6500 words. Canadian Engineer, Oct. 23, Toronto, Canada.

The Public and the Engineer. Discussion regarding insufficient compensation of engineers, their relation to public affairs, and the oversupply of engineer graduates. By C. Hansel, advisory engr. and investigator, N. Y. C. 2000 words. Engineering News-Record, Oct. 2, New York.

Some Problems Confronting Municipal Engineers in England. Supply of materials; labor difficulties; use of machinery necessary. By C. Brownridge, boro engr., Birkenhead, England. 1300 words. Municipal and County Engineering, October. Indianapolis, Ind.

What the War Has Done for Engineers, and Part Engineers Have to Play in Reconstruction. By Col. R. E. B. Crompton; Abstract of presidential address before Junior Institution of Engineers. 3000 words. Engineering and Contracting, Oct. 29, Chicago.

Reconstruction Problems of British Municipal Engineers. By E. J. Elford, municipal engr., Cardiff. From Journal of Institution of Municipal and County Engineers, London. 1800 words. Engineering and Contracting, Oct. 29, Chicago.

Why Do Most Practicing Engineers Study So Little? Editorial. 2500 words. Engineering and Contracting, Oct. 29, Chicago.

National Department of Public Works vs. Corps of Engineers, U. S. A. By Isham Randolph. 1500 words. Engineering World, Oct. 1, Chicago.

Cost Plus Contract with Minimum Fee Guarantee. 900 words. Engineering and Contracting, Oct. 22, Chicago.

Advantages of Cost Plus Form of Contract. Abstract of address By Brig.-Gen. R. C. Marshall, Jr., Chf. of Constr. Div., U. S. A., Washington, D. C., before Boston Society of Civ. Engrs. 5600 words. Engineering and Contracting, Oct. 22, Chicago.

Cost-Keeping in Cost-Plus Fixed-Fee Contracts. How costs are kept under cost-plus-fixed-fee contract; books kept at job office; open for owner's and architect's inspection. By F. A. Wells, vice-pres. and treas., Wells Bros. Constr. Co., Chicago. 5 ills. 2800 words. Engineering World, Oct. 15, Chicago.

The Overhead Cost in Contracting. What overhead consists of; how to figure overhead and proper selling price of a job. From paper before Master Builders' Ass'n of St. Louis, by Dan Carey. 2600 words. Engineering and Contracting, Oct. 22, Chicago.

Bidding on Public Work. When officials can and can not exercise discretion; must observe provisions under which bids were invited; rejecting all bids. By J. J. Simpson. 2800 words. Municipal Journal and Public Works, Oct. 25, New York.

Sextant and Stadia-Rod Method for Measuring Distance. Topographic mapping of Alaska coast line facilitated by special stadia; accuracy tested with good results. By B. A. Baird, San Francisco. 1600 words. Engineering News-Record Oct. 2, New York.

Transportation Surveys for Rural Motor Express Routes. By J. A. Collins, 2000 words. Southern Good Roads, October, Lexington, N. C.

British Excavating Machinery. By A. E. Collins, city engr., Norwich, Eng., from "Water and Water Engineering," London, Sept. 20. 3 ills., 1800 words. Engineering and Contracting, Oct. 29, Chicago.

School Building Program. Letter by L. D. Upson, director, Detroit Bureau of Governmental Research, in answer to editorial in recent issue of this journal. 300 words. Municipal Journal and Public Works, Oct. 4, New York.

Rules for Drafting Practice. Cover concisely dimensions of drawings, allowable scales, character of lettering and many other points. 1000 words. Canadian Engineer, Oct. 16, Toronto, Ont.

Reconstruction and Civic Development. What we have learned from war and what we can take from Europe; "co-operation" the slogan for reconstruction period. Excerpts from address before Canadian Club of Ottawa, by C. H. Mitchell, dean of faculty of applied science and engrg. University of Toronto. 3000 words. Canadian Engineer, Oct. 30, Toronto, Can.

An Equalizing Reservoir for Labor. Some system should be devised by which occasional labor surplus could be utilized to benefit both laborer and public. 400 words. Municipal Journal and Public Works, Oct. 18, New York.

Houston in the Food Business. City has taken over three stalls in market house. 150 words. Municipal Journal and Public Works, Oct. 25, New York.

Mechanical Device for Reading Curves and Tables. Simplifies determination when charts require simultaneous readings of several elements; charts cleared. 1 ill., 700 words. Engineering News-Record, Oct. 2, New York.

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## MONEY VALUE OF LIGHT AND AIR.

Where "the sky is the limit" for height of buildings, it may also be the only direction from which light can be obtained by older buildings surrounded by ambitious neighbors; which means that skylight windows are the only ones that receive direct light, and these receive sunlight for only a few hours a day. The actual deterioration of property value caused by such a condition may not always be realized.

An illustration is cited in the Newark building zone report in this issue. After the destruction by fire of the Equitable building in New York, owners of the surrounding land offered to pay two and a quarter million dollars if the new building would be restricted to a height of eight stories. This was a closely figured business proposition, and demonstrates that the absence of a building height ordinance limiting the height to 100 feet cost these two or three properties at least that amount of money in rental values capitalized.

No matter how high a new building may be carried, a newer can be carried higher unless restrained by law, and no builder can be assured that the value of his property will not be lowered disastrously by overshadowing buildings in a year or two after construction.

A citizen is as surely entitled to protection by the city from this theft of property value as from theft of his purse by robbers or of his good name by libel.

## NON-RIGID PAVEMENT FOUNDATIONS.

It has come to be accepted by many engineers as a foregone conclusion that a so-called "permanent" pavement must have a cement-concrete base, this including brick, wood block, stone block, sheet asphalt, and in many cases bituminous concrete also. It is true that several prominent authorities have contended that a bituminous concrete base was preferable for a bituminous surface, and that many brick pavements laid directly on a sand foundation and stone block ones laid on gravel have given excellent service; but such construction has generally been looked upon as out of date and make-shift.

At the convention of the American Society for Municipal Improvements, however, several prominent paving experts advocated the use of old macadam, and even the laying of new macadam, as preferable to laying a new concrete base for these durable pavements. This was not solely or even chiefly because of the saving in cost—in fact most of the speakers said little conceiving this—but because of the advantage of a porous, non-rigid base. One paper contained the statement that, for a bituminous wearing surface, rigidity of base "is actually detrimental under many if not most conditions of subsoil and drainage." For brick pavement, a rolled broken-stone base was recommended as practically eliminating injury from frost action.. Bituminous concrete wearing surfaces on a telford base were found, in Essex county, New Jersey, to have suffered less from four years of wear than similar surfaces on concrete base.

These papers, abstracted in this issue, will furnish instructive reading to those interested in paving.

union membership and activities, and were found guilty. Sentence was withheld while union members announced openly that any punishment of their leaders would be met by a strike. Within a few hours of the union officers' suspension the other members of the union walked out.

### Jersey City Suppressing Firemen's Union.

Jersey City, N. J.—Public service commissioner F. X. O'Brien is carrying out a sweeping reorganization of the fire department, which he declared had become demoralized, since it became unionized a short time ago, to such an extent that it was becoming a menace to the city. Not only did Mr. O'Brien transfer 97 men, admittedly with the intention in many instances of punishing them, but he restored fire drills as a disciplinary measure, threatened a wholesale shakeup of some 200 to 300 men unless there was quick reform, asserted that some of the leaders in insubordination would be tried and dismissed and proclaimed his determination to replace practically the whole force with ex-service men, rather than permit it to become "Bolshevik." Among the men transferred were two captains. "There will be dismissals. The men will have fair trials, but I will be the judge. I have evidence that convinces me of the insubordination and of disregard of orders and of one flat refusal to obey orders. There are three men who have been urging the others on. I know there have been secret meetings. I have never taken a cent of political contribution from the men of the department of which I am the head. I have aimed to make firemen and not contributors or statesmen or politicians."

### Twenty-Five Cities Vote For Two-Platoon Plan.

Boston, Mass.—Twenty-seven cities and one town in Massachusetts voted at the recent elections on the question of the adoption of the two-platoon system for fire departments. Five cities—Boston, Malden, Melrose, Newton and Beverly—also the town of Brookline, defeated the plan; the others accepted it. In Boston those opposed to the two-platoon plan won by a margin of 5446, the vote being "yes" 37,605, "no" 43,051. The vote in the other cities was:

| | | | Majority | |
|---|---|---|---|---|
| | Yes | No | Yes | No |
| Beverly | 1,457 | 1,659 | ..... | 202 |
| Brockton | 5,821 | 2,916 | 2,906 | ..... |
| Brookline | 2,168 | 2,838 | ..... | 670 |
| Chelsea | 2,513 | 1,164 | 1,349 | ..... |
| Chicopee | 1,911 | 1,189 | 522 | ..... |
| Fall River | 9,405 | 2,677 | 6,728 | ..... |
| Fitchburg | 2,938 | 1,832 | 1,106 | ..... |
| Haverhill | 4,312 | 1,942 | 2,370 | ..... |
| Lawrence | 7,280 | 2,373 | 4,907 | ..... |
| Leominster | 1,426 | 872 | 554 | ..... |
| Lowell | 7,143 | 5,754 | 1,389 | ..... |
| Lynn | 9,195 | 4,002 | 5,193 | ..... |
| Malden | 2,407 | 3,623 | ..... | 1,216 |
| Melrose | 1,030 | 1,899 | ..... | 869 |
| Methuen | 1,216 | 655 | 561 | ..... |
| New Bedford | 8,322 | 3,829 | 4,493 | ..... |
| Newton | 2,447 | 4,138 | ..... | 1,691 |
| Northampton | 1,802 | 1,167 | 635 | ..... |
| Peabody | 1,423 | 943 | 480 | ..... |
| Pittsfield | 4,286 | 1,141 | 3,145 | ..... |
| Quincy | 3,254 | 2,418 | 836 | ..... |
| Revere | 2,778 | 516 | 2,262 | ..... |
| Salem | 3,129 | 2,758 | 371 | ..... |
| Somerville | 6,609 | 3,948 | 2,661 | ..... |
| Springfield | 9,179 | 3,167 | 6,012 | ..... |
| Taunton | 2,733 | 1,498 | 1,275 | ..... |
| Worcester | 15,250 | 4,885 | 10,168 | ..... |

Fire Commissioner Murphy, in comenting on the result, said: "If the two-platoon system had been accepted by the voters of Boston it would have meant an annual increased expenditure of approximately $400,000. Its adoption would have meant also the downfall of the present efficiency of the department. To establish the two-platoon system and still maintain the present efficiency of the department in numerical strength would mean the establishment of such a system as would cost the city of Bosten $600,000 a year. The officers of the department were opposed to the two-platoon system because theory realized if it were accepted that the extra expense entailed would prevent their salaries from being increased. They have had no increase since 1914, and they feel that they deserve it. The men, a majority of them, have favored not only a two-platoon system but also an increase in their pay. If both the two-platoon system and an increase in pay were granted to the men it would mean approximately an increase of $1,100,000 yearly in the fire department alone." Mayor Peters, before the election, issued two statements to show how well the firemen had been treated in the last few years, and what the proposed system would mean financially to the city. He was seconded by the Finance Commission and the Good Government Association. The strongest argument against adoption of the two-platoon plan, in the opinion of the politicans, was not the increase to the tax rate which a maximum additional expense of $600,000 would mean, but the mayor's statement that this additional outlay would jeopardize the interests of school teachers and other city employees, who are looking for generous salary advances next year, and thus constitute an injustice.

## GOVERNMENT AND FINANCE

### City Manager Plan Adopted.

Lima, O.—The city approved the commission manager form of government by a safe majority at the recent election. Fifteen men were elected to write the charter under which the new government will operate.

### Chicago Approves Big Bond Issues.

Chicago, Ill.—Big bond issues for carrying out the Chicago Plan were approved by good majorities at the recent election. The votes were as follows:

| | For | Against | Majority |
|---|---|---|---|
| Western Avenue ($2,400,000) | 160,374 | 63,886 | 96,488 |
| Ogden Avenue ($5,400,000) | 159,628 | 60,579 | 99,049 |
| South Water Street ($3,800,000) | 160,160 | 61,443 | 98,717 |
| Robey Street ($9,200,000) | 155,554 | 63,501 | 92,053 |
| Ashland Avenue ($5,800,000) | 154,536 | 62,378 | 92,053 |
| Michigan Avenue ($2,0000,000) | 157,036 | 57,754 | 99,282 |

The non-partisan election law was approved by a vote of 119,017 for to 85,318 against, a majority of 33,636. The "fifty-ward" law got a bare majority of 856, the vote being 102,958 against 102,102. By a majority of 99,937 the votes favored a two-year term for the alderman, 149,441 voting for two years and 49,569 for a four year term.

### Newport News Approves City Manager Plan

Newport News, Va.—Newport News voted for the city manager plan of government by a majority of more than 4 to 1 at the recent election. The plan provides for a city manager, a paid council of five, the obliteration of ward lines and the initiative and referendum and recall.

### Mayor Found Guilty of Fraud.

Muncie, Ind.—Seven alleged swindlers, including mayor Rollin H. Bunch of Muncie, and prosecuting attorney Horace G. Murphy of Delaware County, were found guilty in the Federal Court in Indianapolis of conspiring to use mails to defraud. The seven men were part of a group of twenty-four indicted in connection with the Muncie case, which involved more than twenty alleged swindling cases and a total of $150,000. All the other defendants had pleaded guilty, some having changed their pleas to guilty during the trial.

## TRAFFIC AND TRANSPORTATION

### Zone Fare Tried Again in New Jersey.

Trenton, N. J.—The Public Service Railway Company has filed with the Public Utilities Commission a temporary acceptance of the modified zone fare system, proposed by the commission after the company had asked permission to abandon the system as first tried because it proved a failure. The new rate is 5 cents for the first two miles, 1 cent for each mile thereafter, and 1 cent for a transfer. A statement issued by the company, after reviewing the earlier trial of the system, its reluctant conclusion that it could not succeed, its recommendations for its abandonment, and the commission's proposal of a modified zoning plan, continues: "The company has no pride of opinion in this matter, and is willing, out of deference of the expressed opinion and recommendation of the board, as set forth in its last two reports on the subject, to continue the trial of the present zone plan for a limited time, with the modified rate of fare recommended by the board. The company takes this position in the hope that the board, the public, and its employes will all co-operate with it in this further trial of the zone plan, so that there may be no difference of opinion about its success or failure. The company agrees to this plan and these rates, in accordance with its understanding of the board's intentions, only as a trial for a limited period."

Camden, N. J.—This city, which put up a most stubborn fight against the zone fare system as first tried, is expected to prove just as inimical to the modified plan proposed by the Public Utilities Commission and agreed to for purposes of experiment by the Public Service Railway Company. Shipyard workers whose boycott of the lines was so violent it forced virtual suspension of service for some days, appear to be just as reluctant to permit trial of the new plan and Camden officials and citizens express themselves as extremely displeased with the proposed solution of the transit difficulties. In the absence of mayor Charles H. Ellis who led the fight against the zone system counsel E. G. C. Bleakley, also active in the struggle, issued this statement: "The trolley riders have won won a great victory. The trolley company has been forced to accept reduced rates of fare. Here in Camden we agree with the trolley company that the zone system is a failure. I think the people have always been willing to give any system a fair trial, but the people in the suburbs were not willing to pay fare in excess of the commutation rates on steam trains. Now, if the trolley company will go only one step further and introduce the sale of strip tickets from ticket offices at rates reduced below cash fares, I feel another step forward will have been taken toward inducing the trolley company's patrons to again patronize the lines. I am sure all the people of Camden will work together with the trolley company in its effort to have its present zone system done away with."

### Toledo Carless.

Toledo, O.—With all street cars taken off the streets and removed to points across the state line into Michigan, the city is relying on jitneys, busses and other vehicles to transport its inhabitants. Removal of the street cars was the result of sudden and secret action by the Toledo Railways & Light Co., a subsidiary of the Cities Service Company, of which Henry L. Doherty of New York is president. The cars were taken off about 1:30 o'clock in the morning. Not only the cars in active operation, but even the open summer cars, snow sweepers and other traffic equipment taken off. The action of the company was taken when it learned the official vote on the ouster ordinance submitted to the people at the recent election. This ordinance was carried by 811 votes. The ordinance was passed by council last June when the company raised its fares from 5 to 6 cents and 2 cents extra for transfers. The company has no franchises for street car operation. When council passed this ouster ordinance it was held in abeyance when the street car company and business men petitioned for a referendum on the ordinance. Negotiations have not resulted in putting back the cars and the company officials do not expect resumption of service for a month. Negotiations are being carried on to develop a new franchise along modern lines involving a "cost-plus" plan, perhaps. Henry L. Doherty, operating head of the company proposed the following courses if the city wished an early resumption of car service: 1—That the city council immediately enact two ordinances submitted to that body by the "Rail-Light" two months ago—the Tayler "service at cost" plan and the straight-out municipal ownership plan. 2—That organized labor, through the central labor union, the newspaper, the Commerce club and the public, determine what it wants in the meantime, so that when it goes to the polls to vote on the two ordinances it will give a decisive victory to one or the other. 3—That Mayor Schreiber immediately name competent persons to appraise the property of the "Rail-Light," Henry L. Doherty to pay $25,000 toward this task. 4—The street cars to be put in operation as soon as the council enacts the two ordinances and a valuation of the property has been completed, and the cars then to be operated until the voters determine which of the ordinances they desire.

## MISCELLANEOUS

### $16,000,000 Developments Planned For Seattle.

Seattle, Wash.—The ultimate expenditure of an amount in excess of $16,000,000 to carry out the plans of the city engineer's department which will bring about physical conditions in the vast industrial area south of the railroad depots permitting of the development of this property has been authorized by the city council. Council has called for the immediate preparation of detailed plans by city enginer Dimock covering the problems to be met under plan No. 1 of the five sets of plans submitted by the city engineer for consideration and outlined as follows:

Plan No. 1.—Provides that all of the running tracks of the railways and the railway yards as well shall be raised to such elevation whereby subways can be constructed beneath draining by gravity into sewers. In this plan it is not contemplated that service tracks nor tracks on East Marginal Way and Railroad Avenue shall be raised. The estimated cost of work planned is figured as follows: Retaining walls $4,000,000, filing $2,500,000 subways, viaducts and approaches $9,500,000. Total $16,000,000.

Plan No. 2.—Differs from Plan No. 1 only in respect to the elevation of the yards and running tracks, the general elevation being about five feet lower than in Plan No. 1. The cost is figured at $14,500,000.

Plan No. 3.—Provides for the raising of the street grade sufficiently to permit of the railways to occupy the base grade and pass under the streets and is estimated to cost in excess of $17,500,000.

Engineer Dimock stated that he did not advise this plan as being practical.

Plan No. 4.—Provides for the leaving of the tracks and yards at surface grade and raising those streets which intersect the railway tracks at a cost of $11,500,000.

Plan No. 5.—Provides for the separation of passenger and freight traffic, passenger trains to be brought in on the easterly side of the tide flats to the present stations. Freight trains would be brought over East Marginal Way to a large distributing yard to be constructed south of Spokane Street and between Colorado Avenue and Duwamish Waterway. Present yards would be devoted to industrial uses served by spur tracks with an overhead structure on Spokane Street and on a few other streets in that vicinity. The cost of this project is not estimated in view of the fact that the value of the properties to be acquired cannot be determined.

The principal advantage of Plan No. 5 is the extension and enlargement of docks and slips along the East Marginal Way made possible by the proposed vacation of East Marginal Way and the substitution thereof of Colorado Avenue. It is pointed out that a great shipping point must have an adequate area of railway yards and trackage in close proximity to vessels.

### Dutch Municipalities Organize Building Material Company.

The Hague, Holland—The Central Building Material Supply Bureau of the Dutch Government, which was abandoned several months ago, has been replaced by a limited liability company called the Central Building Materials Supply Co. This company has a share capital of 3,000,000 florins (about $1,200,000), divided into shares of 10,000 florins (about $4,000) each. Half of the capital is already paid up, and according to the statutes of the company the remaining half must be paid up before January 1, 1923, unless the limit is extended by the Crown. Practically all of the capital is owned by larger municipalities in Holland. The object of the company is to buy, sell, work up, and prepare building materials of all kinds. The profits of the company are employed in the first place to pay 5 per cent. to the shareholders, any balance left over after this dividend is paid out being added to the reserve fund. This addition to the reserve fund is to continue until the fund is equal to the paid-up capital; any balance which then remains will be distributed as dividends. The Central Building Material Supply Co. is essentially a war organization; it is in effect a cooperative organization which has ben brought into life with a view to serving the public interest. There is considerable opposition to the company from the side of private capital, and it is the announced intention of the directors to hold a general shareholders' meeting when the abnormal war conditions have somewhat disappeared for the purpose of deciding whether or not the company should liquidate.

## LEGAL NEWS

### A Summary and Notes of Recent Decision—Rulings of Interest to Municipalities

### Injunction By Taxpayer of Corporate Stock Issue.

(N.Y.Sup.) A taxpayer may sue to enjoin issue of corporate stock for purpose of paying off revenue bonds, since the issue of corporate stock would diminish borrowing capacity of city for making of public improvements, and in the end increase city's interest charge. (Per Mills, J.)—Schieffelin v. Hylan, 176 N. Y. S. 809.

### Interpretation of City Ordinances.

(Md.) The general rules of construction which govern in the interpretation of acts of the Legislature are applicable to ordinances, and the rules governing the courts in determining whether an act has been passed in accordance with constitutional provision are applicable in determining whether a city ordinance has been passed in accordance with the city charter.—City of Baltimore v. First Methodist Episcopal Church of Baltimore City, 107 A. 351.

### Police Power to Destroy Property—Judicial Determination.

(Minn.) Though an order of municipal officer or board in the exercise of a police power restricting the use of property or ordering its destruction may not amount to taking of property without due process and may not entitle owner to an injunction, yet in some way he is entitled to have a judicial determination of the rightfulness of taking or destruction.—Pelkey v. National Surety Co., 173 N. W. 435.

### Assessing Railroad for Paving Street without Special Benefit.

(N.J.Sup.) Under P. L. 1896, p. 407 (1 Comp. St. 1910, p. 994) and an act revising and amending Charter of Newark approved March 11, 1857 (P. L. p. 116), an assessment for paving a street adjoining a railroad's property, but from which street there was no entrance by reason of an embankment, and for a sidewalk thereon, was illegal, as being without special benefit to a distinct railroad use.—Erie R. Co. v. Board of Com'rs of Newark, 107 A. 406.

The proper rule as to assessments of railroad property for local improvements is not on the basis of enhancement of its market value, but that it may be assessed to the extent of actual benefits for railroad purposes.—Id.

### City Authorization of Increased Car Fares—Right of Taxpayers to Sue.

(La.) Action of city of New Orleans in authorizing by ordinance a temporary increase of street railway fares, not releasing or extinguishing an indebtedness, liability, or obligation of a street railway corporation to city, but having effect of increasing amounts to become due by increasing company's revenues of which city receives a certain percentage, did not violate Const. art. 59, as to release of debts to municipalities.—Black v. New Orleans Ry. & Light Co., 82 So. 81.

The putting into effect of modification of city's contract between city of New Orleans with street railway, permitting a temporary increase of fares by city of New Orleans, before 10 days after adoption of ordinance was permitted under city charter (Act No. 159 of 1912, § 35), and where 10 days had passed since ordinance was adopted, the property rights of resident taxpayers were not affected by such action, even if irregular.—Id.

Contracts between a city and a street railway permitting an increase in fares as a war measure for a limited time at suggestion of national authorities to avoid receivership, etc., were made for public good, so that city taxpayers not alleging any vested right in contracts, or that ordinance was unreasonable or in bad faith, or that their taxes would be increased, and not referring to any law forbidding city to modify contract, had no interest to sue to enjoin collection of increased fares, and suit against city will be dismissed, in view of Code Prac. art. 15.—Id.

### Pension for Policeman's Widow—Pneumonia while on Duty.

(N.J.) The widow of a police officer, who while unwell went on duty on a foggy, damp night and suffered a chill, which developed into fatal pneumonia, was entitled to receive a pension under P. L. 1911, p. 104, § 4—Maitland v. Board of Police Com'rs of City of Garfield, 107 A. 411.

### Powers of Public and Quasi-Public Corporations.

(Fla.) "Municipal corporations" embrace incorporated cities, villages, and towns, which are full-fledged corporations with all the powers, duties, and liabilities incident to such status.—Forbes Pioneer Boat Line v. Board of Com'rs of Everglades Drainage Dist., 82 So. 346.

When a private corporation is invested with certain powers of a public nature to permit it to discharge duties to the public, it loses its strictly private character and becomes quasi public, a corporation being public when created for public purposes only, connected with the administration of government, and where the whole interests and franchises are the exclusive property and domain of the government itself.—Id.

Public corporations are subdivided into municipal and public quasi corporations, the latter possessing only a portion of the powers, duties, and liabilities of corporations, such as counties, townships, school districts, etc.—Id.

### Assessment of Buildings Under Construction.

(N.Y.Sup.) Greater New York Charter, § 889a, as added by Laws 1913, c. 324, provides that "a building in course of construction, commenced since the preceding 1st day of October and not ready for occupancy, shall not be assessed," must be interpreted in light of Tenement House Law, §§ 120, 121, relating to construction and occupancy, and a building is no longer "in course of construction" when it is completed pursuant to requirements of law.—People ex rel. No. 176 West Eighty-Seventh St. Corporation v. Cantor, 176 N.Y.S. 593.

Where construction of apartment house was compelted in accordance with laws and plans approved by building and tenement department, prior to October 1, 1917, at which time all apartments were leased, and rents for that month paid in full in advance, it was not exempt from taxation under Greater New York Charter, § 889a, as added by Laws 1913, c. 324, as a "building in course of construction," though on that date all steam radiators had not been installed or connection of some gas ranges made.—Id.

### Sewer Contract Bond—Claims for Labor and Material Enforceable.

(S.D.) A contractor building city sewers had the right for his own benefit to enter into contract with the defendant surety under which the latter might obligate itself to pay labor and materialmen upon contractor's failure to pay them, and materialmen not named therein could accept the contract thus tendered by the insurer and become parties thereto with right of action in case of contractor's default, and such contract would not be affected by the fact that it also indemnified the city against laborers' and materialmen's claims.—Evans & Howard Fire Brick Co. v. National Surety Co., 173 N. W. 448.

Where the consideration for a contractor's bond was paid by the contractor and not by the city, such payment would constitute sufficient consideration, even though laborers and materialmen for whose benefit it may have been given were not named as parties thereto nor even cognizant of his existence, and such persons by adopting the promise made for their benefit could put themselves into privity with the promisor and enforce the promise.—Id.

Where a contractor has expressly agreed to pay all claims for labor and material and his guarantor binds himself to pay for such labor and material equally with the contractor, laborers and materialmen may adopt such guaranty and enforce it the same as though made directly to them.—Id.

# NEWS OF THE SOCIETIES

**Dec. 10.** AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS. Annual convention, Louisville, Ky.

**Dec. 25.** AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Annual meeting, New York City. Secretary, Calvin W. Rice, 29 West 39 st., New York City.

**Feb. 9-13, 1920.**—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention, Louisville, Ky. Secretary, E. L. Powers, 150 Nassau street, New York. City.

**May 18-21, 1920.** NATIONAL ELECTRIC LIGHT ASSOCIATION. Annual convention, Pasadena, Cal. Acting Secretary S. A. Sewall, 29 West 39 st., New York City.

## New England Water Works Association.

The December meeting of the New England Water Works Association will be held at Hotel Brunswick, Boston, Mass., December 10. Following a meeting of the executive committee at the headquarters, Tremont Temple and a lunch served at Hotel Brunswick, Copley Square, the following papers will be read in the afternoon:

"My Trip to France," Col. Richard K. Hale, Boston, Mass. Report of Committee on Budget for 1920, George A. Carpenter, Chairman, City Enginer, Pawtucket, R. I. Discussion of Creed W. Fulton's Paper, "Modern Pumps for Small Water Works," opened by A. O. Doane, Div. Engineer, Metropolitan Water Works, Boston, Mass. "Description of Motor Driven Portable Thawing Machine Mounted on Truck," Frank J. Gifford, Supt. Dedham Water Company, Dedham, Mass.

## American Association of Engineers.

The Engineers' and Architects' Association of Southern California, a society of three hundred engineers and architects which has been in existence for over twenty-five years, voted on October 25th to amalgamate with the American Association of Engineers. The new organization will be a combination of the E. and A. Association and the Los Angeles Chapter of the American Association of Engineers, and will be known as the "Engineers' and Architects' Association—Los Angeles Chapter of the American Association of Engineers." The officers of the Engineers' and Architects' Association are H. A. Osborne, president; J. J. Backus, first vice-president; H. L. Smith, second vice-president. The directors are A. B. Benton, G. B. Bergstrom, A. H. Koebig, and George P. Robinson. Mr. Robinson is also secretary of the organization.

The American Association of Engineers has recently organized chapters or clubs in the following cities:

Globe-Miami, Ariz.; Terre Haute, Ind.; Phoenix, Ariz.; San Antonio, Tex.; Tulsa, Okla.; Joliet, Ill.; Butte, Mont.; University of Minnesota; University of Arizona; University of Michigan; Davenport, Ia.; Rock Island, Ill.; Moline, Ill.; Morgantown, Pocatello, Ida.; El Reno, Okla.; Arkansas City, Ark.; Akron, O.; Springfield, Ill.; New Orleans, La.; Newell, S. D.

The establishment of a club at the last named city is of particular interest because of the fact that it is named after Dr. F. H. Newell, now president of the American Association of Engineers, while he was director of the United States Reclamation Service. Newell is north and west of the Black Hills and at the point of one of the former operations of the Reclamation Service.

The Houston (Texas) Engineers' Club has voted almost unanimously to affiliate with the American Association of Engineers. The officers elected by the Houston Club are: L. T. Peden, president; A. C. Finn, vice-president; C. N. Campbell, second vice-president; W. A. McDonald, third vice-president; S. M. Udden, secretary-treasurer.

The Chattanooga Chapter of A.A.E. is offering its members courses in night work in reinforced concrete, physics, chemistry, Spanish, English, salesmanship and other subjects. Additional courses will be added as a demand for them develops. The tuition is free but members enrolling are required to deposit a registration fee of $2.50 for each two courses, which is refunded upon completion of the work. The year's program is divided into two terms of twelve weeks each, the first commencing on October 14th.

The following officers have been elected by the Utah Chapter of the American Association of Engineers which has headquarters in Salt Lake City: W. A. Richmond, president; W. A. Alexander, 1st vice-president; C. S. Fisher, 2nd vice-president; Jos. Blickensderfer, secretary and Eugene Bush, treasurer.

## Society of Terminal Engineers.

At its recent regular meeting in New York City, at Engineering Society's building, the Society of Terminal Engineers again discussed the question of design and construction of the new municipal piers proposed for Staten Island, N. Y.

The discussion was an extended one and it resulted in the passing of a resolution providing for the appointment of a committee of seven members to investigate, study and report on the general and broad question of the relative costs of handling freight manually and mechanically in this country and Europe.

This committee is headed by Charles Whiting Baker, and other members are engineers especially experienced in the use of mechanical handling appliances. B. F. Cresson, jr., chief engineer of the New York & New Jersey Port and Harbor Development Commission, who is now investigating very thoroughly this same question as bearing on the pending plan for the port of New York, is a member of this committee. This special committee is expected to go over the handling costs in a very thorough manner, embracing every mechanical movement. It will not only consider and study American conditions but will also include the conditions bearing on this question in British, German, Belgian and French ports.

All information secured by this committee and bearing on relative handling costs will be brought up to date and will reflect actual conditions.

It was generally the consensus of opinion that the plans for the Staten Island piers construction should be changed so that all piers would be made wider than 125 ft. and be of such design as to make possible the application of labor saving devices.

## Western Society of Engineers.

As the result of the recent fiftieth anniversary membership campaign of the Western Society of Engineers, a total of 2096 applications were received, thus increasing the membership to almost three times what it was before the campaign. The success of this campaign led to a general meeting of the society, held in its rooms in Chicago on Nov. 3, at which plans for the future of the society were discussed.

E. T. Howson, chairman of the Development Committee, presented a general report of the work done by this committee so far in discussing plans for expanding the work of the society and increasing its value to the membership. Much study has been given to this matter, especially in view of the very large increase in membership.

It was proposed to have, aside from the regular weekly or semi-wekly evening meetings, occasional luncheon meetings, these to be devoted largely to civic and nontechnical subjects, but which engineers should keep closely posted on. This suggestion was indorsed by many speakers who thought that one such a meeting a month would be very valuable, not only in broadening the knowledge of engineers, but in enabling them to meet socially more frequently.

The society now has five sections devoted to electrical enginering, mechanical engineering, bridge and structural engineering, sanitary, hydraulic and municipal engineering and gas engineering. Three new sections have been authorized as follows: Electrical communication, industrial engineering and railroad engineering. Several speakers advocated the formation of still other sections, devoted to chemical engineering, power-plant engineering and public affairs.

An extension of the committee work was also discussed and among the suggestions made was that a committee be organized to gather data from construction projects involving deep foundations to secure definite information as to the depth of rock in different mittee suggested was one to keep posted on proposed city ordinances involving engineering matters; another one that may be organized should investigate accidents in engineering structures, still another may draft standard contract forms for construc- work.

## INDUSTRIAL NEWS

The Willite Road Construction Co., 51 Chambers st., New York City, reports that Willite pavement has been laid this season in Kingston, N. Y.; Greensboro, N. C.; Brockton, Mass.; Detroit, Mich.; Bluffton, O.; Spencerville, O., and Atlanta, Ga. The Western Willite Construction Co., has laid Willite in a number of places in its territory West of the Rockies.

### Contractors' Organization Opposes Indiscriminate Cost Data Used by Manufacturers.

The Associated General Contractors of America are interested in correcting a tendency on the past of manufacturers equipment and materials used in highway construction to issue indiscriminately inadequate and low cost data to contractors. The organization quotes the following letter received from a contractor who has carefully studied the highway field as well as other branches of construction.

"There is a lot of misinformation being handed out by material dealers and machinery manufacturers in the way of costs. This is especially true in the case of the hard roads program. Representatives of these concerns press upon the engineers low estimates of cost, and then give the same figures to contractors who are either unable to figure the work, or who have not had the necessary experience to qualify them to judge as to whether the information given them is of value or not. Of course, the object of this propaganda is to sell goods, and these men do not intentionally misrepresent costs, but the fact remains that they do, and a low scale of estimated costs is established that reputable contractors have to bump up against."

"There is no doubt," says the organization," that one of the factors which has been of great influence in keeping many of the larger contractors from actively entering the road building field has been the tendency to keep estimates so low as to preclude a reasonable profit. While the more experienced highway engineers are now getting away from this practice, the great increase in highway construction has caused the preparation of plans and estimates so low as to preclude a lot of men who are without sufficient knowledge of the subject, and the scarcity of contractors has led firms which have never done such work to bid without a careful study of the situation.

"Under these conditions it becomes a frequent occurrence for the inexperienced enginer and the inexperienced contractor to be misled by the glowing accounts of equipment performance given out by machinery salesmen or the low cost figures furnished by material men, with the result that the estimate is too low, the bid is too low, and the contractor's bank account soon becomes too low for comfort.

"Cooperation on the part of members of the A. G. C. in putting the issue squarely before the firms whose representatives offer unduly low cost figures should be effective in correcting the situation. Comment on the subject and instance of this abuse will be welcomed by the Secretary."

### Convention of the American Concrete Pipe Association.

The annual convention of the American Concrete Pipe Association will be held in Chicago February 20 and 21. Sectional meetings are to be held in committee rooms of the Great Northern Hotel, but the main convention will take place in the lecture room of the Western Society of Engineers, Monadnock Building—just across the street from the Great Northern.

One section of the convention will be subdivided into three main groups represented in the association—drain tile, reinforced pipe, and sewer pipe.

The annual dinner and entertainment will take place at the Great Northern Hotel Friday night, February 20.

The secretary-treasurer of the association is G. E. Warren, 210 South La-Salle st., Chicago.

**The City Supply Co.**, has been organized in Greenwood, S. C., with temporary quarters in the Peoples Bank bldg., to handle all kinds of municipal and county supplies. The company will act as selling agent for manufacturers of the various articles needed by town and county governments, such as road building machinery and material, road and street signs, disinfectants, street sprinklers, flushers, etc. A McD. Singleton will have charge of the office as manager.

### Motor Transport Show

A striking presentation of the war record of the motor truck was made by the Motor Transport Corps in an exhibition of equipment in New York City, October 16-18.

"Why America Won the War" was the proud slogan of the transport men that was placarded above typical "reasons" in the form of American made trucks and trailers that have seen war service. German trucks were exhibited in comparison to point to an obvious superiority of the American machines.

Practically the only opportunity to appreciate the wonderful work of this organization that has heretofore been offered to the public has been in military parades and then only a fleeting glance has been afforded. However the personal contact with the men and with the implements of the corps at the exhibit proved a lesson in American progressiveness in a remarkable combination of proficiency, skill and accomplishment.

An American ambulance that had carried 15,000 wounded was one of the principal exhibits. It had travelled 20,000 miles in 441 days of active service.

A massive Mack 5-ton searchlight truck that had been used by the engineers for night work in building roads and bridges was one of the features that revealed the adaptability of the truck. A generator attached to the motor in this truck supplies the current for a 1,000,000 candle power field searchlight.

The display of motors included aeroplane, passenger car, and motor truck types.

Trailers of varied description were there to show their usefulness. Photographic trailers with gasoline hot-air heaters, dental bodies with tanks for gas and a telephone exchange with full equipment, were included.

The Motor Transport Corps controls all army motor equipment except heavy artillery tractors, tanks and hospital ambulances. When we entered the war, the United States army did not own more than a thousand motor trucks. A year and a half later it had 124,800 trucks and passenger cars and 21,780 motorcycles in France, and 33,700 trucks and passenger cars and 10,170 motorcycles in this country. Of this total of 190,450 motor vehicles, all but 7,800 were American made.

### Exhibition by Lighting Fixture Manufacturers.

The first annual lighting fixture market and chandelier show will be held Feb. 9-13 in Detroit by the National Council of Lighting Fixture Manufacturers. Conventions of the Lighting Fixture Dealers' Society of America and of the Illuminating Glassware Guild will also be held at the same time. The demand for exhibits space indicates that the show will be a success. C. H. Hofrichter, 8410 Lake avenue, Cleveland, is secretary-treasurer of the National Council of Lighting Fixture Manufacturers and is in charge of arrangements for the show.

**The Goodyear Tire & Rubber Company**, Akron, Ohio, announces the creation of the position of sales manager, and the appointment to that position of L. C. Rockhill, who is widely known in the trade. The Company also announces the close of the most successful year in its already remarkable history, with a total gross sales of over $169,000,000.

Mr. Rockhill has been with Goodyear something over twelve years. Previous to that time he was in the advertising department of a Cleveland newspaper. His first service with Goodyear was in charge of the repair department, which was a subdivision of the automobile tire department, handling repairs and adjustments. He was successively made manager of the aeronautical department, manager of the automobile tire department and assistant sales manager in charge of tire sales.

# Municipal Journal & Public Works.

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## RETURNING TO NORMAL PUBLICATION CONDITIONS.

We have already informed our readers concerning the strike by the New York printers which has caused delay in the publication of this journal. The strike, which began on October 1, ended on November 24, and the printing plants are rapidly getting back to normal conditions. During the period of the strike, some of the publications affected did not appear at all, while of many of the other weeklies only two or three issues were printed. A considerable number arranged to have the printing done in other cities, some only temporarily, but several permanently; while a few adopted expedients such as mimeographing the entire issue of photographing typewritten pages.

Municipal Journal & Public Works, unwilling to inconvenience its readers longer than was absolutely necessary, early made arrangements to have its issues printed and has published them in continuous order, although two or three weeks late; also with a difference of type, because the plant used during this period was not provided with the type regularly used by us. With this issue we renew publication under former conditions and will catch up with our publication date as soon as practicable—by the end of the year if it is possible to do so.

## PAVING HALF-ROADS.

The vehicle-using public is becoming accustomed to detour signs, but that does not mean that they have become reconciled to these time-consuming, machine-wrecking, nerve-racking accompaniments of road construction and repair. If there is any possible way of overcoming this serious inconvenience it should be adopted. It is becoming even more serious, rather than less so, with the increasing use of concrete for pavements, which must stand closed to traffic for an additional week or two after the road has been closed for a similar period while grading and concrete construction was going on.

The only possible plan for avoiding detours that has been suggested, so far as we recall, is to construct and complete one half of a given stretch of road at a time, traffic, meanwhile, using the other side of the center line of the road. To this it is objected that this plan makes a joint and line of weakness in the center of the road; in spite of which, however, it has been followed in many cases.

We suggest that, in the case of roads where two lines of traffic are provided for by a width of 20 feet or more (which should include all durable-surface roads), there be no effort to bond the two halves into one continuously bonded whole, but that they be considered as two pavements, separated from each other, traffic being expected to confine itself to its respective sides and not use the center. There might even be an advantage in setting a line of stone, concrete or brick, raised slightly above the surface, down the center line, the pavement on each side being constructed against this as a curb. Besides the greater convenience to traffic and in construction which this plan would afford, such a center curb, with a color different from that of the pavement, offers another advantage.

Marking a line down the center of a paved street or country road has a strong tendency to prevent automobile accidents. Such a line causes the drivers of cars to unconsciously keep on the right side of the road. Drivers of approaching vehicles have a stronger tendency to keep at a safe distance apart. The decided advantage of the center-line mark was first noticed on the Baltimore-Washington road, where the concrete surface was built one-half at a time, leaving a clearly defined line at the point of juncture. It was noticed that drivers almost universally kept to their own side of the road, whereas on unmarked roads, there was an almost universal tendency to drive in the center of the road and in approaching and passing vehicles the tendency was to allow the smallest margin of clearance possible. Chief engineer Mackall of the Maryland State Road Commission and C. M. Upham, state highway engineer of Delaware, both plan, after observing results on the Maryland road, to paint a black line down the center of their paved state roads.

If it is an advantage to endeavor to persuade drivers to use the two halves of the road as two separate roadways, why inconvenience the public by building them both at once, or increase cost and maintenance troubles by trying to join them into one structural whole, with the joint imperceptible? A line of white stone or concrete down the center of a bituminous road, or of red brick in a concrete road, would furnish a permanent, ineradicable line; and in the case of concrete pavement would provide opportunity for two expansion joints and take the place of the irregular, unsightly crack that is found following the center of so many roads made of this material.

# PIG FEEDING FOR DISPOSAL OF GARBAGE

## Results Obtained at Experimental Farm Operated by the District of Columbia, and Conclusions Therefrom—Selection of Stock—Protection from Disease—Housing and Feeding—Costs and Profits.

By F. S. BESSON,*

There have been rumors during the past few years of fabulous sums made in garbage feeding operations. Therefore, when city garbage collections showed signs of becoming an overload for the District of Columbia reduction plant, the opportunity was grasped to get rid of some of the surplus by feeding and at the same time learn something about this relatively new development in the field of garbage disposal.

Two hundred pigs were purchased, and the detail of Dr. B. T. Woodward, a specialist, was fortunately obtained from the United States Department of Agriculture to supervise operations at the experimental farm. Under his guidance, inspections were made of stockyards and a number of existing feeding enterprises. From the experimental farm data and as a result of these inspections, certain deductions were made and conclusions reached, which are herein set forth.

First of all in garbage feeding, it is necessary to determine the source of supply of the pigs and the contingent elements which so much affect their profitable use as feeders. There is a rather set opinion that garbage bred stock is essential to a successful feeding establishment and that ordinary farm stock is subject to digestive disorders when transferred to a garbage ration. It has been maintained that successful feeders can be developed only after generations of breeding from garbage fed stock.

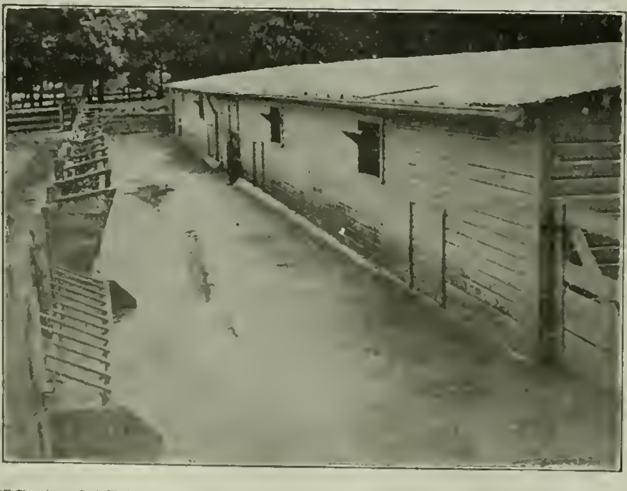

FIG. 1—GARBAGE IN THE SELF-FEEDER EARLY IN THE MORNING PREPARATORY TO TURNING THE PIGS ONTO THE CONCRETE PLATFORM.

If these conditions were true, the difficulties would be such as to preclude pig feeding for the disposal of the garbage collections from a city the size of Washington, requiring a turnover of from 10,000 to 12,000 pigs three times annually.

City garbage feeding must be recognized as a business entirely distinct from pig breeding. This does not mean that a garbage farm might not raise some of its own feeders, but if so, the breeding farm should be separate from that used for garbage feeding, and operated in accordance with the well established rules of pig management without the interjection of those relative to garbage feeding.

The most favorable procedure is to purchase pigs for feeding purposes just after they have passed the 100 lb. stage. All the difficulties of raising small pigs and the attendant high mortalities are thus avoided. The pigs should be fed until they have slightly more than doubled their weight. From the 100 lb. stage to the 225 lb. stage is the most rapid and profitable fattening period of a pig's existence, and the latter weight brings the top market price per pound. A few isolated cases of pregnancy may come to light shortly after purchasing the feeders. If there are not facilities for raising the baby pigs separately from the garbage establishment, the best plan is to kill them as soon as born.

A source of supply for the feeders may be developed among the farmers in the immediate territory surrounding a city, but it is felt that real dependence must be placed upon stock yards. There are sufficient yards in this country within feasible shipping distance of our cities to afford wide latitude in selecting pigs, which may be of various breeds, but their general conformation should be favorable to rapid gains in weight under heavy feeding.

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They should be well set up, with plenty of bone as a support for the flesh that is to be piled on.

In stock yards, the feeders are handled under the rigid supervision of the Bureau of Animal Industry of the Federal Government. It is to the credit of this bureau that that bugbear of the farmer, hog cholera, may be absolutely held under control. At the stock yards, pigs are given hog cholera virus and serum in the simultaneous method of inoculation under the supervision of the bureau's veterinary inspectors. With this treatment, it can be reliably stated that no more trouble from this disease need be expected than from smallpox among persons who have been successfully vaccinated against that dread plague.

Since all stock yards are cholera infected, pigs held without treatment are found, in a few days, to have the disease in its incipient stage. Therefore, the bureau inspectors refuse to supervise the immunization of animals that have been held for more than five days. The bureau also discourages the shipment of animals from one public stockyard to another for purposes other than slaughter. A contractor in the feeding business should be cautious in this respect and patronize those commission merchants who will sell him pigs direct from the farm.

Shipments should be made promptly after immunization or should be delayed for not less than ten days. Truck hauls and shipments not exceeding 36 hours in length can be promptly made to advantage. Little or no feed is necessary during the 24 hours following inoculation, but clean water must be accessible at all times. The pigs purchased for the experimental farm were held at the stock yards ten days at the risk of the commission merchant, for which a charge of one cent per pound was made. During this period the only feed furnished was soaked oats in self feeders and in separate ones a protein concentrate. Upon arrival at the farm, the pigs under short rations were gradually accommodated to garbage feeding.

At the same time as the pigs receive cholera inoculation they should be given serum to make them resistant to hemorrhagic septicemia, known commonly as swine plague. The control of this disease is not definite as is that of hog cholera. With the latter under certain control, swine plague becomes one of the elements demanding most attention in the design of the feeding establishment, in order that conditions surrounding the pigs may be conducive to the prevention and eradication of the disease.

Hemorrhagic septicemia is an infectious disease, attended with a very high mortality. It usually appears as a form of pneumonia, the infectious outbreak of which is caused by an organism that is often found in the soil, upon various plants, and even in the noses and throats of healthy swine, as harmless bacilli which become virulent after passing through diseased animals. The spread of the disease seems to depend nearly as much upon the condition and susceptibility of the animal as upon the contagious nature of the disease. It is well to use bacterial vaccine as a preventative and to keep a supply on hand for use in protecting the unaffected portion of the herd in case of an outbreak, but in addition it is essential to give minute attention to maintaining living and feeding conditions favorable to the prevention of the outbreak.

The breeding or feed of a pig cannot cause either hog cholera or swine plague, but bad methods may so weaken the constitution and vitality that the animal becomes more susceptible to them than would otherwise be the case. Scrupulous cleanliness is necessary for a successful feeding establishment. Contrary to common belief, pigs have some habits which raise them above other domestic animals from the standpoint of cleanliness. The animals must be kept dry, and wallows are absolutely unnecessary on a garbage feeding farm. Wet, muddy, or damp conditions are sure to lead to some form of pneumonia.

At one farm, during the raging of swine plague thereon, it was found that the pigs practically had to swim in order to pass from their houses to their feeding platforms. To reach their drinking troughs, they had to wade through mud up to their bellies. Similar conditions are invariably found at farms where pigs are permitted access to streams for drinking purposes. Bad feeding arrangements are too often prevalent. Animals are compelled to root their food out of mud or accumulations of refuse left from previous days' feedings. When platforms are used they are often placed so that the pigs have to crawl over each other and continually fight in order to get their food. Aside from the fact that the conditions enumerated are conducive to disease, the principal aim of a feeding enterprise is defeated, and that is —fatten the stock for market in the shortest possible time.

It is surprising on what small acreage this aim can be accomplished. During the short life of a hundred days or so at the feeding farm, exercise for the pigs further than that accomplished in the acts of eating and drinking is unnecessary. Fifty square feet per animal is an abundance of room for an open yard, with eight square feet for housing and an equal area for feeding. These areas are maximum ones. The three photographs herewith give a good idea of the arrangements at the experimental farm. The complete installation, not counting the cost of the land, was $8.00 per pig.

The photographs show some details worthy of noting. The house is built between the yard and the concrete feeding platform. The pigs are not permitted direct access to the latter from the house, but only by way of concrete pathways at either end of the house and through its middle. The tracking of garbage into the house is thus prevented. These pathways also prevent the tracking of soil from the yard onto the feeding platform. Each morning the pigs are shut off the platform. A truck is then driven in and the refuse from the previous day's feed shoveled off, and the platform scrubbed clean. The self-feeders are filled with garbage and the pigs turned in with enough food before them to satisfy them not only for the day, but also for the night.

On the average it takes from 20 to 25 lbs. of garbage consumed per pig per day to add one pound of flesh per day, which gain is attainable in a successful establishment. In winter, during the period of rich garbage, about

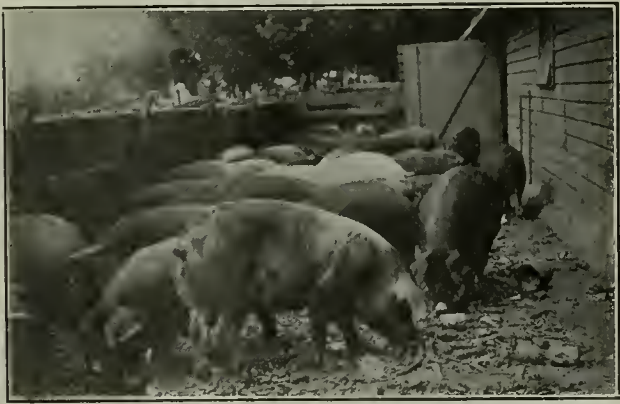

FIG. 2—LATE IN THE DAY; GARBAGE WELL CULLED OVER AND NON-EDIBLE REFUSE APPARENT.

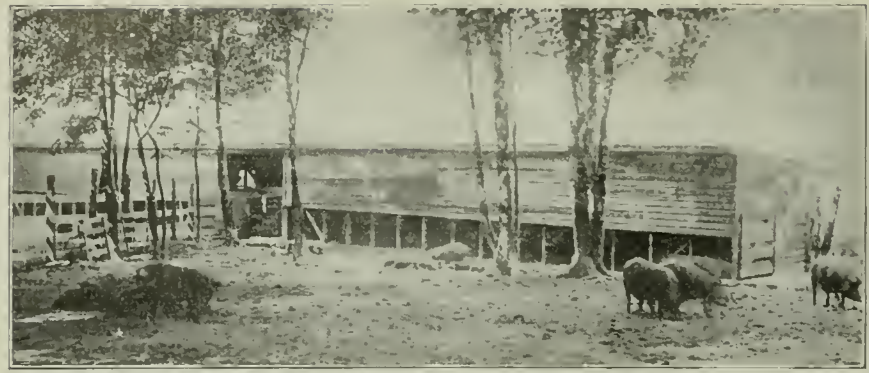

FIG. 3—YARD IN REAR OF HOUSE, EXPERIMENTAL FARM.

15 to 20 lbs. of the feed per pig is refuse and is not consumed, and must be daily cleaned from the platform. In summer this is increased to about 30 lbs. per pig, due to the presence of a large amount of watermelon rinds, corn cobs and other similar remains of fruits and vegetables not eaten by the pigs. The refuse from garbage feeding has a high value as a fertilizer. Naturally, these figures and the value of the refuse fertilizer are dependent upon the degree of separation enforced upon the householders by the municipality. If the exclusion of tin cans, bottles and other trash is not enforced, the refuse may be of outrageous proportions.

The use of a self-feeder permits water and juices to drain from the garbage rapidly. It is the cleanest method of feeding, and holds the amount of refuse to a minimum. Some difficulties are presented in winter in northern latitudes, due to the garbage freezing and sticking in the feeder. It was early found that, with the opening at the floor level, the pigs had to work too hard to get the garbage out of the feeder. Self-feeders for garbage should be built on a curb, so that the feeding opening is about 8 inches above the floor level.

Pigs may be fed directly from concrete platforms. These must be given rapid slope to grease traps connected with drain pipes, in order to get rid of the sloppy water in the garbage. Dump trucks driving in on the platforms deliver their loads direct, with a minimum of labor, but the refuse collected after feeding is increased materially over that in the feeder method, due to tramping by the pigs. This means food is paid for and wasted, and the labor of carting off the refuse is increased. Nevertheless, platform feeding has its advantages under some conditions.

It may be noted that the assumption in the above is that raw garbage is to be fed. It is difficult to justify the cooking or sterilizing of garbage. Practical data do not show that good is done thereby and, aside from the expense entailed, harm is done the pigs. In theory, profit can be made by the reclamation of grease from cooked garbage prior to feeding, but in practice failure has resulted. Opinion is current that the feeding of raw garbage leads to soft pork. To the contrary the experimental farm pigs sold above market prices, and their dressed weight was 81 per cent of their live weight, which is well above the average of farm bred pork.

A sloppy mess floated down to pigs is not only intrinsically bad, but also it defeats the practice of selective feeding. Onions, pickles, tomatoes and many other substances are eaten, as in the case of cooked garbage, only when there is no other recourse. The craving of the pigs' appetites must not only be satisfied as to the amount of food, but also as to the kind. The marked success of the self feeding system of pig raising is largely due to the fact that they can eat an abundance of those feeds which nourish them to the best advantage. Pigs are naturally self-fed animals, and raw garbage affords them opportunity to follow their natural instincts.

Returning to the photographs, at each end of the feeding platform is drinking water, easily available while the pigs are eating. The slats over the trough are nailed to the fence in the rear, about a foot over the trough. Thus, or by the use of the slats in an "A" frame, the pigs are prevented from lying on top of the trough. A drink cannot be obtained if a pig puts as much as his front feet in the water. Filth is not permitted to accumulate in the bottom of the troughs. The water is kept fresh by automatic overflows. Of course, water troughs are also provided in the yard, special attention being paid to drainage, in order that the ground around the troughs may be kept dry.

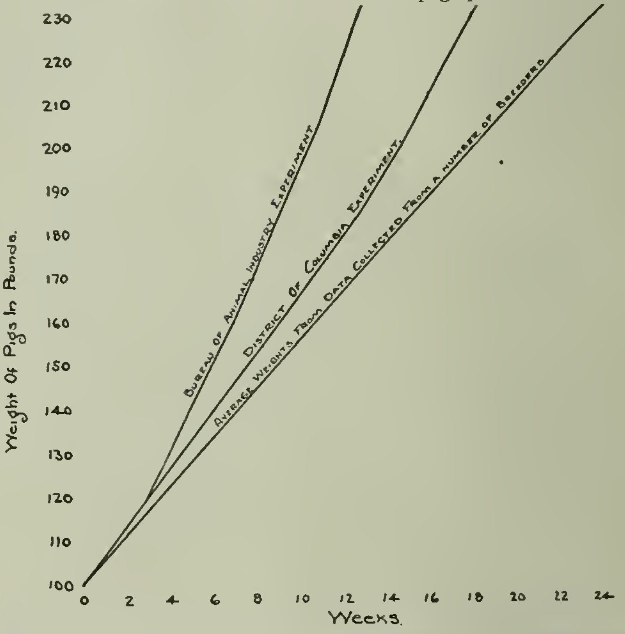

FIG. 4—COMPARISON OF AVERAGE WEEKLY WEIGHTS OF PIGS AT EXPERIMENTAL FARM WITH SIMILAR WEIGHTS OF 121 AT THE BUREAU OF ANIMAL INDUSTRY FARM AND THOSE OF A NUMBER OF STOCK BREEDERS.

The house is constructed with a tight floor in order that cold draughts from below will not be conducive to pneumonia among the pigs. The roof is high enough to permit a man to stand erect while cleaning. It is remarkable how many pig houses are not so constructed, notwithstanding the detriment to cleanliness constituted by the failure to do so. The cleanings from the floor of the house are shoveled through small doors opening upon the feeding platform and hauled away with the refuse from the garbage. A thin layer of sand is usually kept on the board floor of the house. To the credit of the pigs, it is stated that the house needs but occasional cleaning, as they go outside to deposit their excreta.

The droppings in the yard are raked up daily. It is found that these amount to six pounds per pig per day, which exceeds by several pounds the excreta from pigs not fed on garbage, as determined by the Bureau of Animal Industry. These droppings have a very high value as a fertilizer. The consistency of the droppings is closely watched, as thereby is afforded an indication of the physical condition of the pigs. When necessary, epsom salts is mixed with their drinking water.

Ordinarily, this is all the medical attention pigs need while at the feeding farm. In cases of individual sick pigs, short rations, a laxative and the use of the isolated quarantine pen will suffice. As stated heretofore, a supply of hemorrhagic septicemia vaccine should be kept so that it will be right at hand if your veterinarian decides that the appearance of a disease in which a number of hogs are similarly affected calls for its use.

At the experimental farm, of the 200 pigs purchased, eight died, all during the first thirty days. Seven died from swine plague and one from a poisoned cut from a tin can. The shipping weight of the pigs for the experimental farm was 21,095 pounds. The receiving weight was 20,053 pounds. The selling weight after an average of 136 days was 46,405 pounds. This gives a gain over the receiving weight of 26,352 pounds, or of 1.06 pounds per pig per day. Figure 4 shows the average weekly weights of the pigs that were sold, as compared with similar weights of 121 at the Bureau of Animal Industry Farm, Beltsville, Maryland. These latter were carefully fed in order to fatten them for market and the results are above those obtained by a number of practical breeders, according to data collected by the bureau.

There are certain definite expenses connected with a garbage feeding enterprise that must be taken cognizance of. With relatively close approximation, these may be stated as follows:

$2.00 per pig immunization and dipping.
$1.00 per pig quarantine at commission merchant's risk.
$1.50 per pig freight and shipping costs.
$ .50 per pig medical care.

Other charges should be fixed definitely by the conditions of the contract. It is important that the garbage supply should not be subject to erratic fluctuations, which will be the case if the municipality permits private piggeries flourishing on the outskirts to promiscuously collect garbage throughout the city. Under such conditions the public contractor loses the cream of the collections. The terms of the contract should provide for the supply of all the city garbage, and as stated heretofore, proper separation must be enforced.

The least time for which a contract should be entered into is three years, and five years is a more favorable term. Upon this depends the cost for maintenance and amortization of structures and farm equipment, which should not exceed one dollar per pig. Also, it is necessary that a contract run a number of years in order that sales on a falling market may be compensated by those on a rising market. The amount bid per ton for garbage delivered at the farm may vary from three to eight times the price per pound of live killing hogs on the Chicago market. The bid would depend greatly upon the city in question. For instance, the inhabitants of some cities are great fish eaters, and the garbage therefrom has little value from a pig feeding standpoint. In some cities separation is poorly enforced and the garbage is correspondingly poor in quality.

With an average bid of five times the price of live killing hogs and a supposititious price of 15 cents per pound, garbage costs the contractor 75 cents per ton. On a basis of three tons of garbage for each pig during its life at the farm, the cost for feed is $2.25 per pig. Adding this to previously enumerated fixed costs, with a labor allowance of $1.50 per pig, gives a total of $9.75 per pig.

The pigs gain an average of 120 pounds, worth, at 15 cents per pound, $18.00. The difference between the selling price and the fixed costs, or $8.25 per pig, covers incidentals, overhead and profits. Management determines whether or not incidentals, represented largely by hemorraghic septicemia, eat up the profits. Under fair management, pigs, with a turnover three times annually, may well compete with reduction processes in the disposal of city garbage.

# CAPACITIES OF SMALL SEPTIC TANKS.

## Few Data Available for Designing Sizes—Standards of Capacities Fixed by North Carolina Board of Health.

By S. E. PETERS.

It is surprising how little definite information concerning the capacities of small septic tanks is revealed by a search through the various books covering the subject of sewage treatment, or through the files of the engineering periodicals. Either there is a real and definite lack of data, or else the idea seems to prevail that an installation too small for computation along regular lines of sewage flow is too small for consideration.

There are, in an installation of this kind, such enormously complicating factors that set rules of design are almost worthless. Sizes of families, and of individuals in families; number of bathroom fixtures, and availability and amount of water, are but a few of these reasons. No attempt will be made in this article to lay down any such set rules, but from the data given below, information to fit various cases may be selected.

The various state boards of health are surprisingly vague (excepting North Carolina, of which more will be said later), and a search of their requirements gives little real information. Metcalf and Eddy, in Volume III of their work on Sewerage, state that Fletcher, at Sugar Hill, N. H., allowed 20 gallons per person daily, but give practically no other information on this particular subject; nor in Folwell's "Sewerage" is much additional information to be found.

The latest requirements of the various states show that Wisconsin requires, where there is a water carriage system, 4 cubic feet of tank capacity per person contributing to the tank. On a 24-hour retention basis, as a standard, this means 30 gallons capacity per person. Ohio calls for 560 gallons for four to ten persons and 50 gallons per person for all others, though in another publication of about the same date, 50 gallons per person, straight, is required. Kentucky requires not less than 24 nor more than 48 hours' retention period, leaving the question of capacity to the individual. For single houses, the tank is limited in size to not more than 5 feet in depth or width.

In Texas, a retention period of 24 hours is specified. Illinois also requires a retention period of 24 hours, and fixes the basis of design as 45 gallons per person. Warren, in a publication of the Department of Agriculture, states that 24 hours' retention capacity is necessary, with an additional allowance of 25 per cent for sludge. He estimates the average use of water, with a good water supply, to be 40 gallons per capita.

It should be noted at this point that a septic tank is one fed by a water-carriage system of sewerage. The small privy installation employing the septic principle, to which the necessary water is added by buckets or similar device, is defined as the septic privy. Not one of the above laws make any specific reference to this type of installation, excepting possibly Kentucky, though it is a numerous and, from a sanitary standpoint, important one.

The intending purchaser of a small septic tank or privy installation is practically obliged to follow one of three courses. He may consult an engineer; he may place himself in the hands of a manufacturer of the commercial types of the septic privy; or he may go out and get a plumber, a carpenter or an ex-concrete foreman temporarily out of a job, or maybe a bridge builder, to design and build him one. If he does the first or the second, he will usually get a good job; the last may be classed as a very poor risk.

The inherent ability of this type of installation to work under adverse conditions will sometimes come to the rescue of the pseudo-engineer; but too often the reverse is true. The writer has in mind a place where the local carpenter put in a tank 6 feet long, 4 feet deep and 4 feet wide to care for the sewage from a hotel normally accommodating 150 people, and in rush times caring for 250. But the straw that broke the camel's back was the fact that the baffle was unfortunately placed upside down.

Some three or four firms now manufacture septic tanks and septic privies, mainly of concrete, but also of steel. On the whole, these firms turn out a product of a very high class, and stand behind their product. While the tanks they produce, as a rule, operate very well, there is not uniformity in the capacities of the competing companies, each, till very recently, installing such sizes as seemed to them suited to the work or the money available.

The first real step toward standardizing the capacities of septic tanks and septic privies for homes, mills, schools and the like has been made by the North Carolina State Board of Health. This action was the natural result of a law passed recently in that state requiring the installation of sanitary privies throughout the state, under regulations to be issued by the State Board of Health. These regulations, as issued, specified with a considerable degree of refinement, the sizes of septic tanks and septic privies for various conditions. Methods of disposal, kind and sizes of secondary treatment, and similar details are also included.

For schools, a capacity of 15 gallons per capita in septic tanks, with a minimum size of 500 gallons, is required. The length of drain tile for sub-surface irrigation is not specified other than "to be sufficient to dispose of entire effluent, depending on soil conditions." The effluent may be discharged directly into running streams not tributary to a water supply, and where no nuisance will be caused. When sand filters are used, the plant must be equipped with two alternating siphons and have two sand filters, each with 3¼ square feet of area per capita.

Septic tanks for mills and similar industrial requirements, if having baths, must have 25 gallons capacity per person, up to 20 operatives, and 20 gallons per person above that number. Where there are no baths, 20 gallons is required up to 20 persons and 15 gallons each for more. The minimum under this ruling is 400 gallons. For such industrial installations, 7½ square feet of sand filter area must be provided on each sand bed.

Septic tanks for homes must have a minimum capacity of 200 gallons, with a length of drain tile of 200 feet. This minimum requirement is subject to the necessity of providing 30 gallons per capita up to 25 people and 20 gallons per capita above that number.

Septic privies (no water carriage system), when used in schools, must have 100 gallons capacity in the sludge chamber and 45 gallons in the effluent chamber, for 15 pupils, with 20 feet of drain tile. For 15 to 30 pupils, the sludge chamber must be of 175 gallons, the effluent chamber of 50 gallons and the tile length of 40 feet. For 30 to 45 pupils, 250 gallons and 55 gallons, respectively, with 50 feet of tile, are required. For more than 45 pupils, 50 gallons of sludge storage capacity is added, with corresponding increases in effluent chamber size and tile length, for each unit of 15 pupils.

For mills and similar industrial installations, the same schedule may be used, replacing each group of 15 pupils with a unit of 8 operatives.

# BUILDING ZONES FOR NEWARK.*

## Regulations for Area Districts—Rear Yards—Building Lines—Regulating Existing Buildings—Board of Appeals.

### AREA DISTRICTS.

In approaching the formulation of the area regulations, the attempt has been made not to impose more stringent provisions relating to the size of courts and yards or the percentage of the lot that may be covered by different types of buildings than is now generally the rule, but to set aside districts in which each type may be erected substantially in the same manner as at present without fear of molestation by types injurious to it.

In other words, the factory loft, the warehouse, the office building, the store, the tenement, and the private dwelling may be erected in the future the same as in the past. There will be this difference, however—that the buildings erected in any particular district will all have to conform to certain minimum standards of open space, factories occupying nearly all of the lot will not be allowed to exploit sections developed with apartment houses covering only seventy per cent of the lot, and apartments will in their turn be prohibited from stealing the light and air of districts improved with dwellings utilizing but a quarter of the lot. The factory as such, however, if it is a factory the erection of which should be allowed, will be permitted to be built substantially as at present provided it is put up in a district occupied by similar buildings. The same is true of the warehouse, the office building, the store, and the tenement; for it has been our aim, not to establish new standards of open space for buildings, but to lay out districts in which buildings conforming to any particular standard may be protected against buildings conforming to an inferior standard.

*Regulations in the Several Area Districts.*—Four classes of area districts are proposed for Newark—A, B, C, and D districts. In each of these districts the size of the courts and yards required is made to vary with the height of the building.

The A districts are designed especially for business and factory buildings requiring outside light and ventilation. Residential buildings erected in A districts are obliged to conform to the regulations prescribed for the B districts. A building situated on a corner lot may occupy the entire lot, but no building on an interior lot is allowed to occupy more than ninety per cent of the lot above the sill level of the second story windows or more than twenty feet above the curb level. Business buildings which do not require any outside light or ventilation, like storage warehouses, coal pockets, grain elevators, etc., may, however, occupy the entire lot even though situated on interior lots.

The ordinance does not stipulate what kind of open spaces must be provided; it simply states that every room in which persons live, sleep, work or congregate shall have at least one window or skylight opening directly either upon a street or upon a rear yard, side yard, outer court or inner court conforming to certain minimum dimensions in proportion to the height of the building.

The B districts were worked out with particular reference to apartment buildings. The regulations were designed to fit into the provisions of the tenement house law. Seventy per cent of the lot may be covered in the case of interior lots; ninety per cent in the case of corner lots. The chief effect of the B district regulations will be to compel all buildings located in tenement house districts to provide courts and yards of approximately the same size as those required for tenement houses.

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*Concluded from page 292.

The C districts are set aside for detached houses on small lots, group houses and apartments occupying a smaller percentage of the lot than that allowed by the tenement house law. In the C districts, buildings are limited to sixty per cent of the area of interior lots; seventy per cent of the area of corner lots. The courts and yards required are also larger than those demanded in the B districts. Yet they are elaborated in such a manner as not to discriminate against the three-family detached houses of which there is such a great number in Newark.

The D districts were constituted to afford the maximum protection thought possible within our constitutional limitations to such private house districts as Weequahic Park, Clinton Hill, and Forest Hill. Apartments are not excluded in the D districts, but if they are erected they will have to conform to the same area regulations as private houses. These provisions, it is thought, are so severe as to make it uneconomic to erect large multi-family houses. Buildings on interior lots may not occupy more than thirty-five per cent of the lot area; on corner lots not more than forty-five per cent of the lot area. They must also be equipped with at least one side yard.

*Rear Yards.*—Stores and business buildings erected on streets other than residence streets may occupy the entire lot up to the second story sill level or to a height of twenty feet above the curb level, no matter what the area district they are in may happen to be. The requirements of a store are the same in an apartment house district as in a detached house district and in both instances the legal provisions should be such as to permit it to occupy the entire ground area with the first floor. But above the ground floor the situation is different. On most local business streets it will be found that the upper floors are used for residential purposes, as they are not profitable for business purposes. The regulations for local business streets beginning at the second floor are, therefore, the same as for residence streets.

All buildings situated on interior lots are required to provide rear yards in the several area districts, except the A districts, where the rear lot line is more than fifty-five feet back from the nearest street. Corner lots not more than fifty feet wide may be improved in any district without providing a rear yard.

To insist on the provision of a rear yard in the A districts would seriously hamper the erection of efficient business buildings in the downtown section where the block unit is often not more than two hundred feet wide. With such shallow blocks it is of course absolutely necessary to permit buildings to run through the block from street to street, as it would be impracticable to limit the depth of large stores, theatres, and office buildings to one hundred feet. When this concession is made to through buildings, there is little object in requiring all buildings that do not run through the block to be equipped with rear yards. Rear yards provided on isolated lots scattered here and there through the block between through buildings do not help the ventilation in the block any more than inner courts.

In elaborating the area regulations for Newark, it therefore seemed reasonable to omit the rear yard requirement for the A districts. Yet it was felt that a deep building with three dead walls, obtaining all its light and air from but one side, is a bad building. Daylight and ventilation other than that coming through the front windows must be provided to have a satisfactory building. Under the regulations proposed for Newark, this result will be accomplished by the provision which limits the maximum area that may be occupied by interior buildings to ninety per cent of the lot. The space left open will undoubtedly very often be located on the rear of the lot, but it need not be located there, for the builder may, as he sees fit, elect either an inner court, an outer court, or side yard.

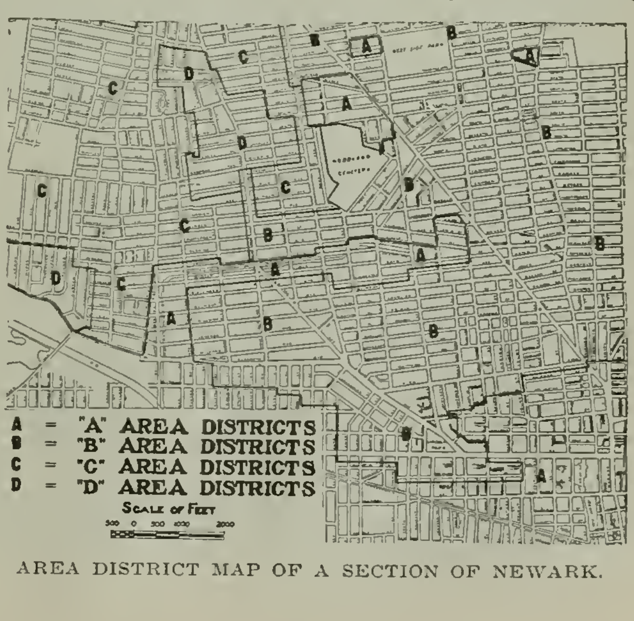
*Building Lines.*—In the past the freedom enjoyed by every owner to erect his building on the street line has seriously prejudiced the highest residential development of many streets. There is probably nothing that enhances the attractiveness of a street with private homes more than an open strip of ground between the street line and the building line. Setting back the houses permits the maintenance of a front lawn with grass and trees; it shuts out the dust and noise of the street; it promotes family privacy; and it affords additional light and air. And yet, in the absence of any obligation binding all the owners within a block to observe a minimum setback line, each owner has felt it necessary to build his house on the street line. His own self-protection has demanded this. If he did not erect his house on the sidewalk, his neighbors on either side might. Being pocketed between two buildings, his house, instead of facing a street, would really front upon an outer court. Countless owners, trusting to the comity of their neighbors, have had their values ruined by themselves observing the amenities of the district.

If we wish to preserve the front yards in our residence districts we cannot permit a situation to continue which rewards the despoiler and blackjacks the benefactor of a neighborhood. A method must be found to protect the house that conforms to a minimum setback line. The proposed ordinance suggests such a method which, though it may not be ideal, still affords a considerable degree of protection to houses in the C and D districts.

The proposition is briefly this: Where at least one-half of the buildings situated on either side of a street between two intersecting streets conform to a minimum setback, no new building may be erected to project beyond it unless an open space is left on each side of the building beyond the setback. Each of these open spaces is required to have a minimum width at every point beyond the setback equal to a least one per cent of the width of the lot on which the building is situated for each one per cent that the building projects beyond the setback.

The effect of this provision would be absolutely to prohibit any new building in a block where half the existing buildings observe a minimum setback line from projecting beyond half the distance to the street or from occupying more than one-quarter of the area between the setback line and the street line. In actual practice, however, it is doubtful whether any building would ever project more than one-quarter of the distance to the street.

*Congestion of Population.*—The commission recommends that no dwelling or tenement house hereafter erected shall accommodate or make provision for more than a given number of families. The number in any particular case varies according to the district and the size of the lot. Thus in the A and B districts the limit expressed on an acreage basis is 140 families; in the C districts 105 families; and in the D districts 25 families. This is equivalent in the A and B districts to eight families on a 25x100 foot lot; in the C districts to six families. In the D districts it is equivalent to two families on a 35x100 foot lot. A family is defined as any



AREA DISTRICT MAP OF A SECTION OF NEWARK.

number of individuals living and cooking together on the premises as a single housekeeping unit.

Experience shows that, in the absence of any restriction on congestion, there is practically no limit to the population that will house itself on a given area of ground. Tenements now being erected in New York accommodate more persons per acre than any of the old slums. In 1914 the average tenement density was 852 in Manhattan and 697 in Brooklyn, with a maximum of 1600. (Streets are not included in the area.) And the maximum is rapidly becoming the average.

The relatively small amount of open space per family provided in extreme cases of overcrowding has not received the serious consideration that it deserves. Where a one-family house occupies 25 per cent of a 50×100 lot there is 3750 square feet of vacant space per family; where a six-story, thirty-family tenement occupies 70 per cent of the lot, the vacant space is 50 square feet per family. Under the regulations proposed for Newark, each family on an interior lot in the A and B districts would have 94 square feet, 166 square feet in the C districts, and 610 square feet in the D districts. Applying height, area and congestion limits to the areas proposed for residential purpose, two million people could be housed within the present area of Newark.

### OTHER PROVISIONS.

The proposed ordinance is not retroactive. Any building or premises may continue in its present use undisturbed. But next to controlling the erection of new buildings, nothing is more important in zoning than to regulate the use of old ones. The latter is as necessary as the former to protect "spotted" districts against steady deterioration.

The regulations controlling non-conforming buildings and uses (except as modified in a specific case by the board of appeals) are in brief as follows:

1. The structural alterations made in such buildings shall not exceed fifty per cent of their assessed value, nor shall the building be enlarged, unless the use is changed to a conforming use.

2. No non-conforming use shall be extended at the expense of a conforming use.

3. In a residence district no building or premises devoted to a use permitted in a business district shall be changed into a use excluded from a business district.

4. In a residence or business district no building or premises devoted to a use permitted in an industrial district shall be changed into a use excluded from an industrial district.

5. In a residence, business or industrial district no building or premises devoted to a use excluded from an industrial district shall be structurally altered if its use shall have been changed since the passage of the ordinance to another use also excluded from an industrial district. On the other hand, no building in either of these three districts devoted to a use excluded from an industrial district shall have its use changed to another use which is also excluded from an industrial district if the building shall have been structurally altered since the passage of the ordinance. A change of use for both of the above cases is defined as a change from one offensive trade to another offensive trade, as for instance, from a dyeing establishment to a fertilizer plant.

*Board of Appeals.*—Provision is made for a board of appeals "to administer the proposed ordinance so as to obviate unnecessary hardship in exceptional cases". This board consists of the superintendent of buildings, the chief engineer, the health officer, the inspector of combustibles, and the president of the tax board.

The authority vested in the board is to be exercised only after public notice and hearing. The property owners in the vicinity of the parcel which is the object of an appeal will in each instance be notified to attend the hearing and present such objections as they may have against the application. If the board is moved by the objection, it may either refuse to grant the appeal or grant it subject to such conditions and safeguards as will meet the objections urged by the neighboring property owners. The board may entertain only such appeals as the proposed ordinance vests in its jurisdiction, and no appeal granted establishes a precedent—each appeal is to be judged on its own merits.

The principal variations which the board may make in specific cases are as follows:

1. Where a use district boundary line divides a lot in a single ownership at the time the ordinance is passed, the board may permit a use authorized on either portion of the lot to extend to the entire lot, but not more than twenty-five feet beyond the boundary line of the district in which the use is authorized.

2. The board may permit the extension of a non-conforming use or building upon a lot so occupied at the time the ordinance is passed.

3. The board may permit an additional building to be erected upon a lot occupied at the time this ordinance is passed by an industrial establishment provided such additional building is to be a part of the present establishment.

4. The board may permit in a business district the construction, extension, alteration or conversion of a building intended for the storage of motor vehicles.

5. The board may in undeveloped sections of the city grant temporary and conditional permits for a period of not more than two years for structures and uses in contravention of the use district regulations of the ordinance.

6. The board may waive the requirement of a building line either in whole or in part in instances where its provision would cause unnecessary hardship to the owner without any compensating benefit to the community.

## PAINTING STANDPIPES.

On pages 313 and 314 will be found the remaining portion of the table referred to by the article on this subject in the November 1st issue. Below are given additional notes concerning cities not given in the table, supplementing those given in last week's issue.

Seattle, Wash.: 3 standpipes, 2 enclosed; painted about every two years, one coat of asphalt; cost about 25 cts. a square yard.

Seneca Falls, N. Y.: Constructed 1896; iron and steel; 30 by 100 feet; no tower or roof; hard surface water, filtered, using alum. Painted in 1901, scraped and wire brushed; 2 coats. Also painted in 1907 and 1911.

Sharpsville, Pa.: Constructed 1900; steel (?); 20 by 40 ft.; no tower or roof; hard water. Not painted since erection.

Tacoma, Wash.: One constructed 1890; iron, 20 by 125 ft., no tower or roof; another in 1909, steel, 40 by 65; a third in 1910, steel, 30 by 70 ft.; all painted with red lead.

Ventnor, N. J.: Constructed about 1907; iron (?), 20 by 100 ft.; no tower or roof; hard ground water. Painted about 1915, material not known; not very satisfactory.

## PREVENTION AND CURE OF "RED WATER."*

### Effected by Removal of Oxygen from Water—Use for This Purpose of Deactivator and Filter.

By WM. H. WALKER.

People who live in districts supplied with soft water, such, for example, as the New England States and New York City, are familiar with what has been termed the "red water plague." This condition of the water is caused by the presence in it of hydrous red oxide of iron, commonly spoken of as rust. The fact that this oxide of iron is present in the water means that the iron pipes of the hot-water supply system have been correspondingly corroded by the water, and have been pitted or otherwise weakened in proportion to the amount of iron removed. Thus the iron is taken from where it is needed, namely, the walls of the pipes, and placed in an objectionable form where it is not wanted, namely, in the water. Many factors incident to modern city life have united in greatly increasing the daily consumption of hot water, and the loss due to failure of pipe lines through clogging by deposited rust, as well as leaks due to pitting, has now become a most important problem.

A great deal of very valuable research has been devoted to the causes of the corrosion of iron, notably by the Massachusetts Institute of Technology, and the seed sown by the early investigators is now beginning to bear fruit. It was

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*Paper before New England Water Works Association.

# Summary of Reports on Painting the Interior Surfaces of Standpipes

| Place | Date Painted | Preparation | No. of Coats | Kind of Paint | Amount and Cost, Including Applying | Condition of Standpipe |
|---|---|---|---|---|---|---|
| Matawan, N. J. | .... | S | .. | Dixon's graphite | | Painted but once since built |
| Medford, N. J. | 1914 | .... | .. | Dixon's graphite | | |
| Media, Pa. | 1909 | S W | 2 | Dixon's graphite | 55 gals., $75 | |
| | 1916 | S W | 2 | Dixon's graphite | 30 gals., $127 | |
| Middleboro, Mass. | 1885 to 1911 | S | 2 | Asphalt locally made | | Painted every 2 or 3 yrs. Metal well protected. Taken down in 1915 |
| Nantucket, Mass. | .... | S W | .. | Various asphalt mixtures and hot Alcatraz asphalt§ | | 18 times between 1878 and 1906. Taken down in 1909 |
| Nantucket, Mass. | 1908 | .... | 2 | Met. P & W. C. graph. elast. No. I | 50 gals | About all gone in 8 yrs. |
| | 1916 | .... | 1 | Bit. mixture put on boiling hot over layers of asphalt varnish | 14 bbl. | |
| Narragansett Pier, R. I. | .... | L | 1 | Graphite | | |
| | .... | L | 1 | Asphalt | | |
| | 1914 | S W | 1 | Asphalt | $375 | |
| Needham, Mass. | | | | No painted since original construction | | |
| New London, Conn. | 1897 | .... | 2. | Asphalt | 30 gals., $90 | |
| | 1903 | .... | .. | Graphite | 53 gals., $102 | |
| | 1909 | W | .. | Graphite | 10 gals., $73 | |
| | 1912 | W | .. | | $99 | |
| New York City | 1911 | .... | 3 | Red lead | | |
| New York City | 1911 | S W | 1 | Red lead | | |
| North Attleboro, Mass. | †† | .... | 2 | Det. Gr. No. 501 "Hyd. priming & No. 106" Hyd. priming | 30 gals. of each Labor for 2 coats, inside and out, $200 | About 1912 sand blasted (cost $1250) after some years' neglect. Badly pitted |
| Norwood, O. | .... | .... | .. | Never painted. | "Paint not needed" | |
| Oak Bluffs, Mass. | 1890 | .... | 3 | Asphalt | | |
| | 1894 | .... | 2 | Asphalt | | Paint mostly gone |
| | 1900 | .... | 2 | D. M. C. on one-half Kauri zinc on rest | | Paint mostly gone |
| | 1907 | .... | 2 | Chrysolite | 31 gals. | D. M. C. All gone on 5 lowest rings. Zinc on some, gone on others |
| | 1911 | .... | 2 | Creolastic black | | |
| Old Orchard, Me. | 1912 | S W | .. | Graphite | | |
| | 1916 | S W | 2 | S & W metallistic | 45 gals. $382* | |
| Onset, Mass. | 1894 | .... | 2 | Iron metallic paint | 10 to 12 gals. | Not durable |
| | 1913 | S W | 2 | Graphite (metallistic) | $200 | |
| Ossining, N. Y. | 1907 | S W | 1 | Asphalt | About 20 gals. | Corrosion very slight; deposit from water seems to protect metal |
| Palatka, Fla. | 1881 | .... | .. | | | |
| | 1896 | .... | 2 | P & B No. 2 | 30 gals. | Inside badly pitted |
| | 1898 | .... | 2 | D M C | 30 gals. | Badly scaled |
| | 1902 | .... | 2 | D M C | 33 gals. | Paint entirely gone |
| | 1911 | .... | 2 | Creolastic | | |
| Paris, Ky. | 1891 | .... | 3 | Asphalt | | |
| | 1905 | .... | 2 | Chrysolite | 35 gals. | |
| Perry, N. Y. | 1900 | S | 2 | Graphite | 1 bbl. | |
| | 1905 | .... | 2 | Graphite | | |
| | 1909 | .... | 2 | Graphite | | |
| | 1912 | .... | 2 | Graphite | | |
| Philadelphia, Pa. | 1882 | .... | 3 | Lead paint | | |
| Philadelphia, Pa. | 1900 | .... | 3 | Lead paint | | |
| Plainville, Mass. | | | | Not painted from 1909 to 1917 | | |
| Portland, Me. (3) | | | | All painted in 1906. Expect to paint in 1917. | | |
| Portland, Ore. | 1909 | .... | 2 | Ferrubron | | |
| | 1914 | .... | .. | | | Outside only |
| Portland, Ore. | 1900 | .... | .. | Red lead | | |
| | 1906 | S W | 2 | Ferrubron | | |
| | 1912 | .... | .. | | | Outside only |
| Portland, Ore. | 1912 | .... | .. | Ferrubron | | |
| Putnam, Conn. | 1885 | .... | 3 | Asphalt | | |
| | 1893 | .... | 1 | Asphalt | | |
| | 1896 | .... | 1 | Asphalt | | |
| | 1905 | D S | 2 | Chrysolite | 25 gals. | 2 bottom sheets and part of third rusty, top sheets in poor shape. |
| Rahway, N. J. | 1906 | .... | 2 | Dixon's sil. graphite | | Upper 30 feet |
| | 1913 | .... | 1 | Red lead | | |
| | | | 1 | Dixon's graphite | | |
| Reading, Mass. | 1895 | W | 1 | Government waterproof | $376* | |
| | 1897 | W | 1 | Smith's D M C | 450* | |
| | 1901 | W | 1 | Smith's D M C | 517* | |
| | 1904 | W | 1 | Smith's D M C | 616* | |
| | 1909 | W | 1 | Smith's D M C | 718* | |
| | 1913 | W | 2 | Bitumastic enamel | 1609* | |
| Rockville, Conn. | 1914 | W | 1 | Asphalt | $125* | |
| Rutland, Mass. | 1896 | .... | .. | Red mineral paint | | Not painted since |
| St. Louis, Mo. | .... | .... | .. | | Never painted. Abandoned after 30 years. Badly pitted at water line only | |
| St. Louis, Mo. | .... | .... | .. | | Interior not painted; still in service; "corrosion negligible" | |
| St. Louis, Mo. | 1898 | .... | 2 | Red lead | | |
| | 1915 | S W | 2 | Red lead | 400 lb. lead, 15 gal. oil, 5 gal. turpentine | Badly corroded in spots. Generally protected by lime coating |
| St. Louis, Mo. | 1908 | .... | 2 | Graphite | | |
| | 1915 | .... | .. | Red lead | | No paint left; very little corrosion; lime coating |
| Sewickly, Pa. | 1907 | L W | 1 | Carbon coating | 25 gals. $60 | |
| | 1911 | | 1 | Carbon coating | 30 gals. $100 | |
| Spencer, Mass. | 1899 | .... | 1 | | | |
| | 1904 | W | 1 | Nat. P & V. Co. graph. elast. | $68* | |
| | 1912 | W | 1 | Nat. P & V. Co. graph. elast. | $60 | |
| Spokane, Wash. | 1904 | W | 1 | Asphalt | | |
| Summit, N. J. | 1914 | S W | 2 | Hot coat similar to bitumastic | | |
| Summit, N. J. | 1894 | S W | 2 | White lead | | |
| | 1900 | | 2 | Hot asphalt | | |
| | 1912 | .... | 2 | Dixon's graphite | 36 gals. | |

### SUMMARY OF REPORTS ON PAINTING THE INTERIOR SURFACES OF STANDPIPES—(Continued)

| Place | Date Painted | Preparation | No. of Coats | Kind of Paint | Amount and Cost, Including Applying | Condition of Standpipe |
|---|---|---|---|---|---|---|
| Millis, Mass. | 1909 | S | 1 | Graphite | ........ | ........ |
| | 1912 | S | 1 | Graphite | ........ | ........ |
| Milwaukee Wis. | .... | .... | .. | Interior not painted | Standpipes in excellent | condition |
| Minneapolis, Minn. | 1915 | S | 1 | Red lead | ........ | ........ |
| Minneapolis, Minn. | 1916 | S | 2 | Red lead | Not painted since 1893 | Paint gone; badly pitted |
| Montclair, N. J. | 1897 | S W | .. | Asphalt | 35 gals., $27 | ........ |
| | 1902 | S W | .. | Harrison's T & C. 106 | 25 gals., $20 | ........ |
| | 1906 | S W | .. | Dixon's graphite | 25 gals. | ........ |
| Syracuse, N. Y. | 1910 | .... | 1 | Red lead | ........ | Inside badly pitted in 1916 |
| | | | 2 | Carbon coating | ........ | |
| Tisbury, Mass. | .... | S W | 2 | White lead | 15 to 20 gals., about $50 | Every 2 years for 10 years. |
| Toledo, O. | ........ | | | Probably similar to c. i. pipe coating | ........ | Not painted since erection; now out of service |
| Tuckahoe, N. Y. | 1912 | S W | 2 | Red lead | ........ | ........ |
| | 1913 | | 2 | Red lead | ........ | ........ |
| | 1914 | | 2 | Red lead | ........ | ........ |
| Vincennes, Ind. | 1910 | S W | 2 | Graphite | ........ | Much ice in standpipe each winter |
| Washington, D. C. | 1910 | S W | 1 | Chrysolite | 12 gals., $65 | ........ |
| | 1915 | | 1 | Chrysolite | 12 gals., $65 | ........ |
| Waterloo, N. Y. | 1914 | .... | 1 | Dixon's graphite | ........ | ........ |
| West Orange, N. J. | 1908 | S W | .. | Dixon's graphite | 25 gals., $32† | ........ |
| Westport, Conn. | 1916 | .... | .. | Hot bitumastic enamuel | ........ | ........ |
| Weymouth, Mass. | 1890 | S W | 2 | Government waterproof | $42‡ | ........ |
| | 1892 | .... | 1 | Government waterproof | $63‡ | ........ |
| | 1894 | .... | 2 | Government waterproof | $56‡ | ........ |
| | 1896 | .... | 2 | Government waterproof | $44‡ | ........ |
| | 1899 | .... | 2 | Government waterproof | $673 | ........ |
| | 1904 | .... | 2 | Waterproof paint | $569 | ........ |
| | 1907 | .... | 2 | Waterproof paint | $620 | ........ |
| | 1911 | .... | 2 | ? | $550 | ........ |
| | 1915 | S W H | 2 | W. H. & Co. red lead in oil. | 40 gals, $643 | ........ |
| Winchester, Mass. | 1910 | .... | 2 | Elastic graphite | 35 gals. | "Lots off ice" |
| | 1916 | S W | .. | ........ | S and W, $25; painting $30 | Asphalt failed after 1 year; 2 coats of el graphite lasted 3yrs.; another 2 coats, 6 yrs. |
| Winchester, Ky. | 1891 | .... | 3 | Asphaltum | ........ | ........ |
| | 1905 | .... | 2 | Chrysolite | 30 gals. | ........ |
| Windsor, Conn. | 1916 | .... | 1 | Det. graph. penstock paint | 30 gals. | ........ |
| | | | 1 | D. G. No. 106 | ........ | ........ |
| Winthrop, Mass. | 1914 | .... | 2 | Metropolitan specification | $475 | Painting when erected poor job |
| Wolcott, N. Y. | 1913 | .... | 2 | Asphalt | $25 | |

Woonsocket, R. I., No 1 painted 1903, 1905, 1907, 1909 and 1914. No. 2 painted 1903, 1905, 1907, 1909 and 1914. No. 3 painted 1902, 1904, 1906, 1908, 1910 and 1914. In each case scraped and wire brushed, and given two coats of durable metal coating. The amount and costs were as follows: No. 1-24 gals., $139; 24½ gals., $130; 24 gals., about $130; 24 gals., $133; 24 gals., about $140. No. 2-27 gals., $162; 28½ gals., $152; 28 gals., about $146; 28 gals., $155; 28 gals., about $167. No. 3-46 gals., $204; 52 gals., $207; 52 gals., $196; 51½ gals., $242; 51½ gals., $217; 51 gals., about $240.

For footnote see page 298.

for many years thought that rust was formed by the direct union of the oxygen of the air, water and the iron. Now we know that such is not the case. In order to form rust, the iron must actually go into solution in the water; if oxygen is present, it later unites with this dissolved iron, separating as red rust. The formation of rust by the oxygen is thus the result of, not the cause of, the solution of the iron and its resultant corrosion. But careful study showed that the oxygen, which is normally dissolved in all water, plays a more direct and controlling part in this corrosion. Where iron dissolves in water, an equivalent or corresponding amount of hydrogen is set free from the water in the form of gas. This hydrogen covers the surface of the iron and protects it from further attack. But if oxygen be present, it unites with this hydrogen, destroys the protective covering and allows the solution of the iron to proceed. Speaking electro-chemically, the hydrogen polarizes the surface of the iron, and the dissolved oxygen acts as a depolarizer. Where there is a complete absence of oxygen in a system, no appreciable corrosion of the iron will take place.

The action of all the factors causing corrosion is greatly accelerated by rise in temperature. Hence a hot-water supply system in which fresh (that is, water fully charged with atmospheric oxygen), hot water is constantly passing through, is a most vulnerable structure. But since oxygen is consumed in the process of corroding iron and forming rust, it is obvious that if the water be held in contact with an iron surface it will soon lose all its dissolved oxygen and become inactive so far as further corrosion is concerned. Careful experiments have established the fact that the amount of corrosion, other factors being the same, is directly proportional to the free oxygen content of the water.

This removal of dissolved oxygen is now accomplished upon a commercial scale by an apparatus called a "deactivator." The water from the street main first passes through a heater to raise the temperature to about 160° Fahr. and then through a storage tank containing a large number of iron sheets chemically treated so that rapid corrosion of their surface takes place. The oxygen is promptly consumed by corroding these cheap and easily replaceable sheets instead of the expensive and difficultly replaceable tank and piping system. The hot water, now free from oxygen but carrying some of the suspended iron rust, passes through a filter where all floating particles are removed, and clear water delivered. This water is now deactivated and can be sent through the supply system without injury to the pipes or inconvenience to the consumer.

In the plant in Pittsburgh, where this process was first tried on a large scale nearly four years ago, some pipe was placed in the outlet from the deactivator. No corrosion has been found so far and the trouble with the old piping in this building has apparently ceased. The metal used to unite with the oxygen in the water is, of course, of the cheapest form and easily replaced. In one plant installed for experimental purposes in an apartment house in Boston, the sheets were removed after two years of service and showed a loss of 25% in weight due to rusting. But no trouble with the piping had developed during that time and experience indicates that none is to be expected so long as this treatment continues. If this amount of rust had come from the pipes, serious trouble would no doubt have occurred.

A detailed description of this process and the two plants referred to above will be found in a paper on "The Preservation of Hot Water Supply Pipe in Theory and Practice" by Speller and Knowland, Trans. American Society of Heating & Ventilating Engineers, 1918.

The advantages of this system are that the deactivation of the water by removal of free oxygen is automatic and does not change the quality of the water for domestic purposes. No attention is required other than the ordinary removal of the accumulated hydroxide of iron from the filter by reversal of the flow at regular intervals.

# NEWS OF THE SOCIETIES

**Dec. 10.** AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS. Annual convention, Louisville, Ky.

**Dec. 25.** AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Annual meeting, New York City. Secretary, Calvin W. Rice, 29 West 39 st., New York City.

**Feb. 9-13, 1920.**—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention, Louisville, Ky. Secretary, E. L. Powers, 150 Nassau street, New York.

**May 18-21, 1920**—NATIONAL ELECTRIC LIGHT ASSOCIATION. Annual convention, Pasadena, Cal. Acting Secretary, S. A. Sewall, 29 West 39th st., New York City.

## National Electric Light Association.

President R. H. Ballard, of the National Electric Light Association, announces the acceptance by John F. Gilchrist, vice-president of the Commonwealth Edison Company, of Chicago, of the chairmanship of the committee on public information, and also by Frank T. Griffith, president of the Portland (Ore.) Railway, Light & Power Company, of the chairmanship of the committee on water-power development. These important committees will have valuable and instructive reports to submit to the national convention of 1920, which will be held in southern California.

The committee on public information is a new committee in each state or geographical section a local committee which will finance itself and furnish news bulletins to the press through member companies. This will be a very large committee, but as its work will be largely devoted to states and geographical sections, it is unlikely that its entire membership will ever be called to meet so that its proportions will not be objectionable. Mr. Gilchrist was instrumental in starting a movement along these lines in Illinois which proved very successful. It is believed that to extend it to every state in which company members may desire assistance will accelerate its effectiveness. In the committee on water-power development Mr. Griffith will associate with himself prominent executives from all of the Pacific Coast companies and also some of the executives from Eastern companies. The purpose of its organization is to investigate and encourage water-power development, and it is the first general committee of the association to take up this most important feature of the electrical industry. The Department of the Interior and the War Industry Board and other bodies have collected an enormous amount of data in relation to the problems of water-power development. Mr. Griffith's committee will not only collect and codify the information gathered by these bodies, putting it into workable shape for the use of geographical and central bodies, but will pursue when there seems to be necessity a line of original investigation. The necessity for conservation of the natural resources of the nation, the impending shortage of both coal and fuel and the probability of large increases in the demand for electric energy by partial railroad electrification, make the work of this committee of paramount importance and its report will be of the greatest assistance in the large financing which extensive water development will involve.

President Ballard has also received from S. M. Kennedy, general agent of the Southern California Edison Company, Los Angeles, his acceptance of the chairmanship of the committee on service and from Lee H. Newbert, Pacific Gas & Electric Corporation, San Francisco, his acceptance of the chairmanship of the committee on cooperation in the industry.

Mr. Kennedy's committee will work on the conditions of service from this viewpoint: With the regulation of rates and finances by state utility commissions to provide only safe returns on capital invested, and with a courageous attitude of these regulating commissions to see that such return is allowed, electric utility companies are entirely out of politics and can devote their energies to the service of the public without any encumbrance to the highest achievement.

Mr. Newbert's committee will endeavor to formulate and submit to the next convention a plan by which all of the branches of the electrical business may cooperate and to show specifically how this plan can be practically worked out in the geographic sections. Mr. Newbert has been very active in the California electrical cooperative campaign, of which he has for several years been chairman. This movement had its origin in the Pacific Coast Section, has met with remarkable success in the organization of central stations, manufacturers, jobbers and contractor-dealers, and has demonstrated that they can work together for the general good of the industry. Chairman Newbert in appointing the members of his committee will make selections from all branches of the industry.

## Western Society of Engineers.

At a meeting held by the Western Society of Engineers in Chicago recently four experts on electric railways presented different phases of the problem.

James R. Bibbins, of the Arnold Co., Chicago, introduced the problem as a whole and gave a historical review. He showed the importance of the electric railway utilities to the communities they serve. Their capitalization of $4,800,000,000 has been subjected to heavy shrinkage. Not only have material costs risen, but wages also, while labor apparently has the whiphand. The public has been educated to the 5-cent fare and demands that consideration be given only to the depreciated value of the properties. Some nine different remedies have been proposed, of which many are quite radical. Mr. Bibbins reviewed the history of a railway system in a large city with 5-cent fare dating to 1860. Fairly stable conditions existed up to 1890 when the line was electrified; the heavy capital costs thereof practically wiped out earnings for nearly 10 years. As they picked up again, optimism was felt and franchise renewals were accepted without proper allowance for depreciation. The 5-cent fare does not now yield sufficient income.

A paper by P. J. Keeley, president of the Kansas City Railways Co., on "Valuation and Accruing Depreciation" was read by secretary Nethercut in Mr. Keeley's absence. At first the problems seemed local and greatly diversified, but more recently they have become national and crystallized into realization that the companies cannot render service on their present incomes. The Federal Electric Railway Commission may produce some valuable findings from its investigation. One feature coming to be recognized is that it is impossible to keep a street railway property in better than 80 to 90 per cent. perfect condition, yet it can give 100 per cent. service. The practice set by the Wisconsin Railroad Commission of fixing rates on the depreciated value of the property is being abandoned by this and other commissions because it is essentially unfair to the investor. Valuation based on reproduction new is now the accepted practice because equitable. Solution lies in acceptance of the cost-of-service principle as basis for rates.

"The Actuarial Problem" was the title of a paper by W. J. Hagenah, consulting engineer, Chicago, read by Mr. Jirgal in the author's absence. Depreciation funds are seldom set aside specifically as such. The practice of accountants is usually to draw on the general surplus or reserve for renewals instead of on special depreciation funds. Each generation should bear its share of development expense and depreciation. Patrons must provide sufficient income to meet costs and investors must make proper allowance for current and accrued depreciation in order to permit continuous service and keep the property intact. Depreciation must be provided for in advance and the income must be sufficient to permit this. There is an undoubted tendency toward using the reproduction cost new as basis for rate making.

George Weston, consulting engineer, Philadelphia, presented a paper on "Electric Railway Policy." One of the most important problems is to secure harmony between labor and capital, then to promote economy and give the best possible service. Public authorities must be fair; in the past they have taken the "pound-of-flesh" attitude too often and denied a fair deal to the companies. Labor must be assigned a participating partnership in the business and compelled to assume its obligations. Assuring it full opportunity to have redress for wrongs, it must be deprived of the right to strike. Mr. Weston referred to the success of the Philadelphia Rapid Transit co-operative plan, which has been developed during 9 years. A feature of it is to promote thrift and stimulate service. Most companies cannot resort to such slow development of co-operative service in the present emergency and must have more revenue.

### National Free Zone Association.

The National Free Zone Association is maturing its plans for an active campaign to secure general permissive legislation at the hands of Congress, authorizing the inauguration of "free zones" in the ports of the United States.

J. S. Dunnigan, of San Francisco, has been made secretary of the association. He is to be established permanently at Washington until Congress takes favorable action.

The aim of the National Free Zone Association is not to bring about the establishment of a free zone in any particular port, but rather to secure the enactment of a bill which will establish the principle of free zones in the United States, placing in the hands of the Secretary of Commerce, or other designated appointees, the matter of determining the location of such zones.

Plans are being matured for a public hearing before the joint committees of Congress which have the bills in question under consideration, and government officials and departments are coming out in favor of the project.

Membership in the association is increasing, several organizations having placed themselves in Class I in the membership, thereby giving the fullest possible support to the work.

The president of the association, Arthur McGurk, of New Orleans, will spend much time in Washington. Mr. McGurk and Mr. Dunnigan will be guided in their activities by the executive committee and board of directors, who have power to act between meetings of the association.

Mr. Dunnigan has temporary quarters at 1925 F street, Washington.

### Pan Pacific Engineering Congress.

A Pan Pacific Engineering Congress, to which engineers from all countries touching the Pacific, including India, are welcome, will be held in Weltevreden, near Batavia, Java, May 8 to 15, 1920, under the patronage of the Governor General of Netherlands India and the auspices of the East Indian branch of the Royal Dutch Institute of Engineers. The fee is $6.25, which includes the printed proceedings of the meeting. English and Dutch will be the official languages.

A total of 469 subscriptions have already been received from many countries, including Japan and Australia, together with 170 papers on engineering problems in Asiatic countries. These papers will be discussed in six groups: Rail and steamer traffic; irrigation, water supply, and sanitary service; roads, bridges, buildings, and city planning; industry and the production of energy; mining industry and geology; and miscellaneous. The discussion will include statistics of various classes, terminal, coaling and port facilities, free ports, irrigation, water supply, the removal of sewage and refuse; the construction of roads, bridges, and buildings of all kinds, with special reference to the construction of cheap dwelling houses for the natives; earthquake and fireproof materials; the financing of public service corporation, taxes, and public loans; the utilization of steam, electric, and water power.

Excursions to the most interesting parts of the islands will be arranged at the close of the congress. Applications for participation in the congress should be sent to the secretary of the Congress (address Molenvliet East 3, Weltevreden, Java), who will arrange for hotel accommodations and trips. Full information regarding trips will be furnished by the Tourist Bureau Ryswyk 17, Weltevreden, Java. The Far Eastern Division of the Bureau of Foreign and Domestic Commerce, Washington, has on file descriptive pamphlets giving considerable information in regard to the congress, including the names of the authors of some of the more important papers.

The congress offers to machinery and metal salesmen a good opportunity to make useful acquaintances and to exhibit samples, as $8,000,000 worth of machinery is bought annually by the Netherlands Indies. Americans must be represented by a Java firm in order to exhibit. A list of the machinery houses in Java will be available in the Far Eastern Division for those who are interested. B. J. Krol, 39 Oosteinde, Bandoeng, Java, is the secretary of the Netherlands Indies Industries Fair and further information can be obtained from him.

## PERSONALS

Smith, Cedric B., has been appointed editor of "The Monad," official publication of the American Association of Engineers. Mr. Smith is a graduate in both arts and civil engineering from the University of Minnesota. His engineering experience has been somewhat extensive in the railroad field. During the war Mr. Smith was an officer in the Coast Artillery Corps, and served in France with the 74th Artillery. Since 1915 he has made his home in Pittsburgh.

Watson, M. W., who has served as acting state highway engineer since July 15, 1918, in the absence of W. S. Gearhart in army service, has been appointed state highway engineer by the Kansas Highway Commission. A large amount of road construction is in progress and more is planned, which will be directly under the supervision of Mr. Watson. Before entering the service of the state, Mr. Watson practiced engineering in connection with coal mining, railroad work and municipal work in southeastern Ohio. He also served in the civilian branch of the United States Army in connection with the improvement of the Ohio River. For five years previous to entering the service of the Kansas Highway Commission as road engineer, in 1917, he served with the Illinois State Highway Department. He is a graduate in civil engineering from the Ohio State University.

Vollmer, H. G., has resigned his position as city engineer of Burlington, Ia., and he will be succeeded by his brother, Henry Vollmer, who recently returned from service abroad.

Cowen, Clinton, for the past four and a half years state highway commissioner of Ohio, has resigned and has accepted a position as consulting engineer for the National Sand and Gravel Association. He will assume his new duties Jan. 1. A. R. Taylor, former county surveyor of Hancock County, has been appointed to fill the vacancy caused by Mr. Cowen's resignation.

Schott, A. M., has been appointed city engineer of Sioux City, Iowa, to succeed T. H. Johnson, who resigned recently to enter private practice.

Tolman, Mayo, former director and chief engineer of the West Virginia State Department of Health, has resigned.

Tisdale, Ellis S., has been appointed director and Andrew N. Wardle chief engineer, respectively, of the West Virginia State Department of Health, both of which positions were filled by Mr. Tolman. Both Mr. Tisdale and Mr. Wardle have served three years as assistant engineers in the State Department of Health.

Webster, D. W., for several years highway engineer of Lyon county, Minnesota, has resigned to accept a position with the state as division engineer of the northwest section. Arthur Bladholm succeeds him.

Gray, Cresleigh, has been appointed engineer in charge of the recently organized bureau of contracts, one of the five subdivisions of the division of construction, Indiana State Highway Commission. Mr. Gray is a graduate of Rose Polytechnic Institute and has been connected with the State Highway Commission since its organization several months ago. Karl Eisenhardt has been appointed assistant engineer of the Bureau of Contracts.

Van Arnsdoll, C. C., and Fred Oehler, of Clarkston, Wash., and E. M. Booth, of Lewiston, Idaho, have formed an engineering partnership to specialize in highway construction work. Mr. Booth was formerly state highway engineer of Idaho.

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City County State

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## SEWAGE PLANT OPERATION.

In the case of any type of operating plant, the actual experience in operation is more valuable as an aid to development toward perfection than any theories based on a study of the plans. With no kind of plant, probably, is this more true than with one for treating sewage, for here there are imperfectly understood agencies modifying or even being relied upon for the processes and changes desired. For this reason, experience in operating such plants is especially valuable.

Unfortunately, however, intelligent and reliable studies of their operation are very few, and there are pitiably few exact scientific data upon which engineers can base their plans for new plants. It would seem, therefore, to be the duty to the profession of all engineers and chemists who have or who can obtain such data to give them publicity, and to use every effort to increase their number and completeness.

In this issue we present some facts concerning the operation of the plant which treats the sewage of Plainfield and two adjacent boroughs. This plant has experienced to an excessive degree the foaming trouble which is reported from so many Imhoff tanks, and has practically mastered it. Superintendent Downes has also worked out a method of disposing of screenings and sludge which seems to solve most satisfactorily (for a sandy soil, at least) this problem which is so troublesome at most plants. The sprinkling filter fly nuisance also has been solved here. Any sewerage engineer could obtain valuable information by a visit to this plant.

## CONTRACT NEWS UP TO DATE.

Last week we renewed the publication of the items of "advance contract news" which have for years been one of the features of this paper in which we congratulate ourselves on far surpassing any of our competitors, but which the printers' strike compelled us to omit for a few weeks. Although the dates of the several issues are still two or three weeks behind those of publication, the contract news is brought up to the date of publication, regardless of the date given to the journal and the consequent anachronism.

## FLOATING GARBAGE REDUCTION PLANT.

Since the article under the above head in this issue was set in type we have learned that the idea of a floating garbage reduction plant has progressed to the point where the Board of Estimate and Apportionment has appropriated funds for preparing plans and specifications for such a plant. It certainly is a novel plan for preventing a nuisance from such a plant to make the plant a floating one and operate it as far off the shore as may be necessary.

# PLAINFIELD'S SEWAGE TREATMENT PLANT

### Interesting Features of Three Years' Operation of Imhoff Tanks and Sprinkling Filters—Excessive Foaming and How It Was Overcome—Fine Screening—Use of Screenings and Sludge on Farm Land.

One of the first communities in this country to build a septic tank and filter the effluent was Plainfield, N. J. After a number of years of service this plant was outgrown, although extended, and the fineness of the local sand rendered it unsuitable for sewage filtration. Consequently, about six years ago the city of Plainfield and the boroughs of North Plainfield and of Dunellen arranged to combine in the construction of a new plant at a new location, which would treat the sewage of all these communities. The organization under which this plant was constructed and the operation is being carried on goes by the name of "The Joint Meeting of the Inhabitants of the City of Plainfield, the Borough of North Plainfield and the Borough of Dunellen." The operation is in charge of an operating committee, being in the immediate charge of a superintendent. The plans were prepared and construction carried out under the supervision of George W. Fuller as engineer, and he is retained as consulting engineer. The superintendent is John R. Downes.

There are several interesting features about this plant, not the least of these being the name which has been given to it—Green Brook Park, and the effort to live up to this designation. The plant is on the bank of and discharges its effluent into Green brook. It is located in a farm of about ninety acres, about forty-five of which are under cultivation. The plant itself is set back about a quarter of a mile from the highway and is reached from it by a driveway lined with Japanese hawthornes, the entrance to this drive being indicated by a good-sized signboard bearing the words "Green Brook Park." The grounds are neatly kept up, the banks around the tanks are sodded, and masses of shrubbery located at effective points; the buildings are of brick with tile roofs, plain but neat of design; and there is nothing to indicate the presence of sewage until one stands over the tanks. There is practically no odor, and altogether the plant might well be considered an addition to the neighborhood rather than a nuisance.

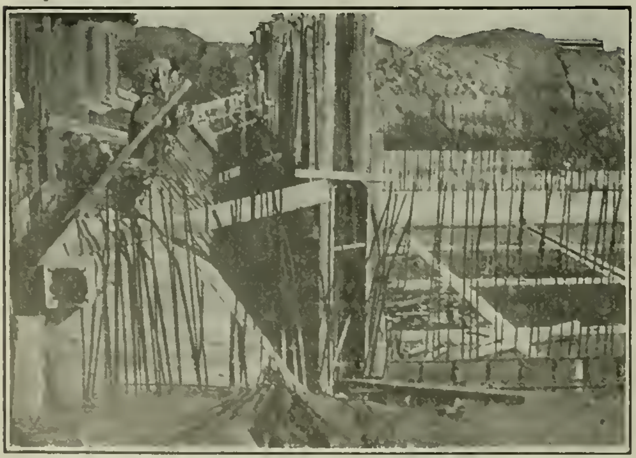
Other somewhat unusual features are the use of a fine screen in advance of the Imhoff tanks; the method of disposing of the sludge; and certain of the experiences encountered in operating the plant and the methods employed in meeting the difficulties.

The sewage from the several communities reaches the plant through a rather long siphon composed of two lines of 20-inch cast iron pipe. Much of the sewage is pumped because of the level country and the long distance over which some of it must travel. The plant went into service in November, 1916, and the siphons have not been cleaned out since then, although it is believed that some sediment has probably collected in them and that cleaning out may sometime become necessary. The sewage is fairly fresh, coming from points from two to ten or twelve miles away, is only partly comminuted and shows no signs of septic action. At the present time the amount reaching the plant averages about three and one-quarter million gallons a day.

The plant as originally constructed consisted of six Imhoff tanks, each sixty feet long and containing five hoppers in the bottom, the walls of the flowing-through compartments having a rather steep slope and being separated by a vertical curtain wall which rests upon the beam placed below the slot to divert the gas to the gas outlets. Two dosing tanks discharge the tank effluent onto sprinkling filters, and the effluent from these passes through a secondary Imhoff tank before being discharged into the brook. The sludge from the tanks is drawn off onto beds at the foot of the embankment along one end of the tanks.

From the time, about three years ago, when the operation of the plant first became established, the effluent has been continuously stable, there having been only one occasion when the methylene blue sample failed to retain its color for twenty-one days. Samples are taken at eleven and three o'clock each day and those treated with methylene blue are kept in bottles for twenty-one days and the bottles then emptied to receive new samples.

The difficulties encountered in the operation have been those found in other plants, that for which the solution was least readily found being the foaming of the tanks. While most Imhoff tanks seem to foam more or less, the foaming at these tanks reached such proportions that there seemed absolutely nothing that could be done but let them foam until they stopped of themselves. The foaming scum overflowed the gas vents (which extended continuously along the entire side of each tank) covering the surface of the sewage in the flowing-through compartment to a depth of a foot or more in spite of all ef-



IMHOFF TANK UNDER CONSTRUCTION.
Showing forms and reinforcement for curtain and outside walls and for inclined bottom slabs of flowing-through compartment.

IMHOFF TANK UNDER CONSTRUCTION.
Showing the outside and curtain walls and inclined slabs partly completed, with reinforcement for the remainder in place.

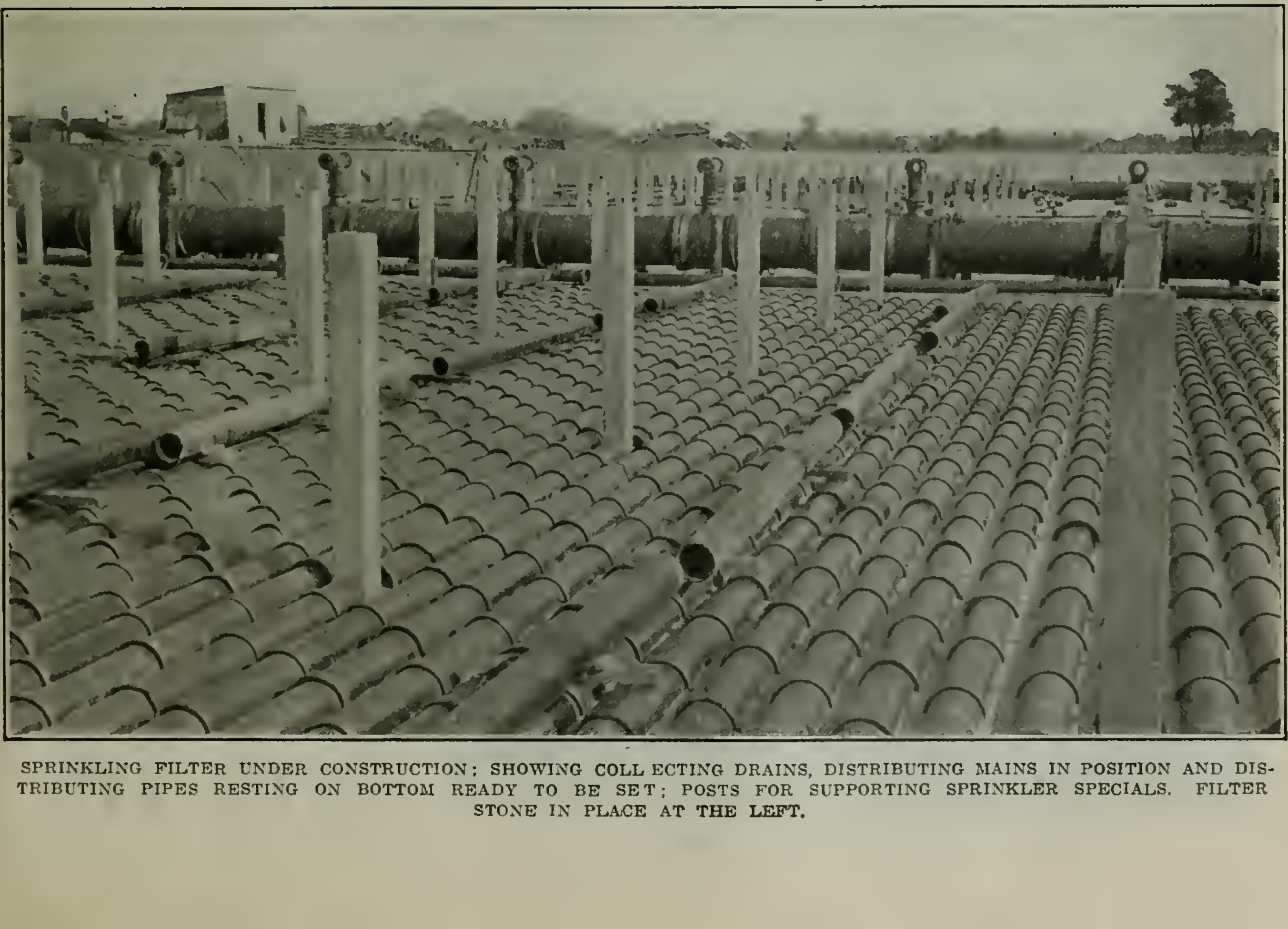
forts to remove it as fast as it formed. By using high baffle boards near the outlets, most of this scum was retained within the tanks, and the foaming appeared to cause very little undesirable effect upon the tank effluent. During the winter a most peculiar phenomenon occurred, the foaming scum in the gas vents freezing over except at certain points, where it rose and froze into "chimneys" resembling stalagmites, through the top of which chimneys the scum continued to rise and overflow and freeze, the chimneys thus being built up to a height of about four feet and the gas continuing to escape from the openings in the tops of them.

While the six tanks were being used continuously, although the amount of sewage was at that time less than that for which they were designed, more than half of the sludge collected in the first of the five hoppers in each tank, and most of the remainder in the second hopper, while reversing the flow only repeated the condition at the other end, giving practically no sludge in the middle compartment and relatively small amounts in the second and fourth. It seemed probable to those in charge that this heavy sludge deposit in the end hoppers might have something to do with the unusual amount of foaming experienced. (The depth of sludge, even if spread throughout the tanks, would be greater than had been estimated, since the size of the sludge compartment was based on an asumption of sludge containing 88 per cent. of water, whereas the sludge which collected was found to average about 96 per cent. water.)

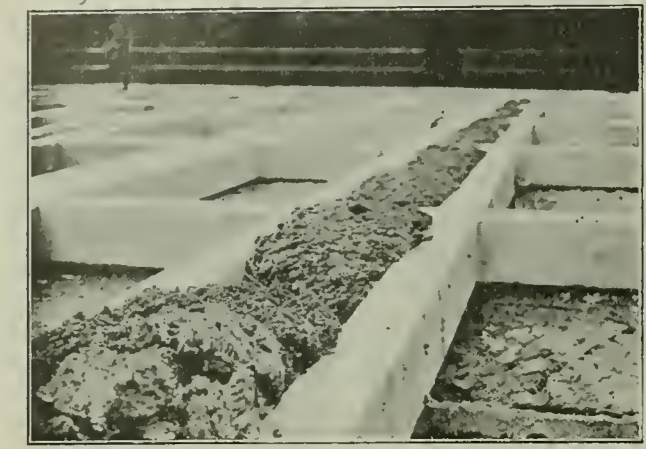
A number of suggestions for overcoming the foaming were made to the engineer and superintendent and others were devised by them, and fifteen or twenty different ideas were tried, but none of these showed any promise of permanent benefit or even temporarily did much to lessen the trouble. Finally, about a year and a half ago, it was decided to try the use of a fine screen for removing the larger suspended matter from the sewage before it entered the tanks, and just about a year ago a R. W. screen was put into operation. At about the same time a change was made in the method of operating the tanks, all of the sewage being sent through two or three tanks at a time; all six tanks were used, but in rotation. This gave two or three times the previous velocity to the sewage passing through the tanks and resulted in distributing the sludge more uniformly throughout the sludge chamber. With the adoption of these two changes in operation the foaming difficulty appears to have been reduced to relatively unimportant dimensions. Whether this is due most to the method of passing the sewage through the tanks more rapidly or to the use of the screen, Superintendent Downes was unable to say, but believes that each should be credited with part of the improvement.

SPRINKLING FILTER UNDER CONSTRUCTION.
Sprinkler main and risers in position.

Although very little foaming has shown itself in the sedimentation tanks for a year now, the change in operation has been accompanied by a considerable increase of foaming in the secondary Imhoff tank, which receives the effluent from the sprinkling filters. The foaming in this one small tank, however, is not so serious as it had been in each of the six primary ones, and can easily be



SPRINKLING FILTER UNDER CONSTRUCTION; SHOWING COLLECTING DRAINS, DISTRIBUTING MAINS IN POSITION AND DISTRIBUTING PIPES RESTING ON BOTTOM READY TO BE SET; POSTS FOR SUPPORTING SPRINKLER SPECIALS. FILTER STONE IN PLACE AT THE LEFT.



HEAVY SCUM IN GAS VENTS.
Nearing the end of the foaming period.

handled by the two or three employes at the plant. In spite of the increased velocity of flow of the sewage through the tanks there has been no trouble with the sprinkling filters. The nozzles practically never stop up, and there is very little pooling on the surface of the filters, what little there is being easily remedied by forking over the stone on the surface. As stated above, the effluent has continued to remain stable, as indicated by the methylene blue test.

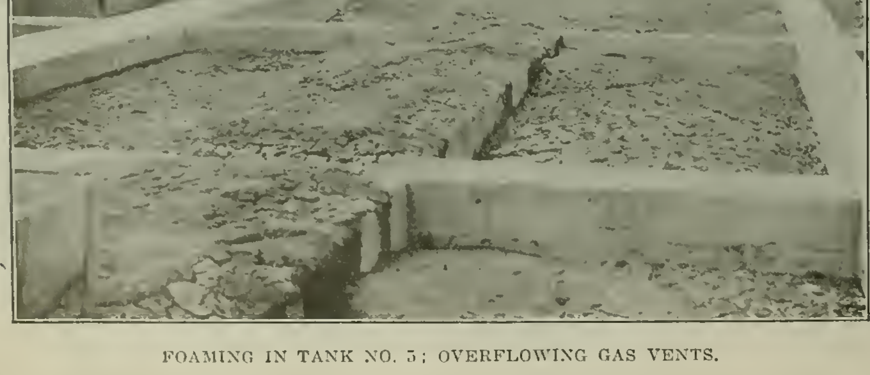
The contract for the fine screen was let in the spring of 1918, and the screen placed in operation about a year ago. This screen is of the R. W. type, ten feet in diameter and set at 15 degrees with the horizontal. The orifices are slots one-sixteenth of an inch wide. There are no slots in the "hat" or projecting part of the screen, which is of solid plates. The bristle brushes brush the screenings into and through a trough, from which they drop into a box about two feet below. Originally, it was intended to brush the screenings into tubs, each holding about 8 cubic feet, but these were found to be too heavy for the men to handle. Instead, an attendant visits the screen about once an hour during the day and shovels the screenings from the trough into a self-loader, which was home-constructed and consists of a wooden chute with one-half its length overhanging and held in horizontal position by means of a latch. A wagon backs in under the overhanging end of the self-loader, the latch is knocked out and the screenings are dumped into the wagon. The self-loader holds one day's collection of screenings at the present time, which amounts to about two cubic yards measured after draining about twelve hours.

The screen removes about 15 per cent of the suspended solids, this figure being obtained by weighing an entire day's screenings and reducing them to a dry basis and comparing them with the suspended matter in the effluent from the screen, also reduced to a dry basis. Quite a number of small pieces of paper up to two or three inches square are found to slide through the slots, and considerable fecal matter is washed through or pushed through by the brushes, so that the effluent does not look greatly dissimilar from the ordinary crude sewage. Mr. Downes believes, however, that the solids removed contain a large percentage of those which caused the foaming trouble, and that the improvement effected is much greater than that indicated by the appearance of the screen effluent.

There has been no trouble with the operation of the screen during the year, which has been continuous. On one occasion a piece of broomstick became wedged in the channel through which the brushes travel, but the brushes jumped over this with a slight jar until it was removed; on another occasion a drowned cat in a bag had to be removed by hand; but aside from a few instances like this, the screen has operated without attention other than oiling and periodic inspection. The cost for power has been almost negligible, the principal expense being about $1,000 a year paid to the night attendant, who would not be needed at the plant but for the screen. The building is necessarily heated in winter to prevent the freezing of the sludge and possibly of the sewage in the screen house, and there is also a slight cost connected with this. The brushes, which are constructed of bristles, are reversed end for end once a week and as yet show no signs of wear or needing renewal.

The screenings which are dumped into the wagon are used for fertilizing the land which is being cultivated. The wagon is furnished with a manure spreader such as is in common use on farms, by which the screenings are spread onto the land, allowed to stand a few hours to drain and then plowed under. A small farm caterpillar tractor is used for hauling the manure spreader and plow. The same spreader is used for spreading the dried sludge on the land. These screenings and sludge are found to be of great benefit to the soil, the crops raised being much heavier where this material is used. One of the neighboring farmers has been using it for about a year on part of his land and the difference between this and the remaining portion of his farm in the appearance of the crops is most remarkable. It is probable that the use of this sludge would not be beneficial on a clay soil, but the soil here is sandy to an indefinite depth, and ordinary fertilizer which is applied to it is washed down about 16 inches below the surface before any appreciable amount of it remains to enrich the soil.

This method of disposing of the screenings and sludge is perhaps the most admirable feature of the operation of this plant, for the originating and working out of which Mr. Downes deserves great credit. It is a great labor saver, and, by eliminating sludge heaps about the grounds,



FOAMING IN TANK NO. 5; OVERFLOWING GAS VENTS.

has noticeably reduced odors as well as improved the appearance of the place. An additional feature of the plan which he devised is the use of a 1,000-gallon tank cart to facilitate the removal of sludge directly from the tanks in emergencies, as when the sludge beds are frozen or filled up. The liquid sludge is run out through a gate in the back of the cart directly onto the land to be fertilized. Although the volume of this wet sludge is much greater than that of bed-dried sludge, the difference in manner of handling makes the direct distribution by tank cart a close rival of the regular method in efficiency.

At present, sludge is drawn from each tank once a month, in rotation. The tanks are used in rotation so that each of the six receives sewage for two or three days and rests for the remainder of the week. The sludge, after drying on the sludge beds, can be shoveled readily into a wagon by means of a fork, and most of it is spread on the Green Brook Park land by a manure spreader, as already described, part also being taken by a farmer living in the vicinity. In drawing off the sludge at these regular intervals, it is found that withdrawing from each of the ten hoppers all of the sludge ready for removal results in lowering the sewage in the tank from two to three inches for each hopper, or a total of about 24 inches for the entire tank, equal to 100 to 120 cubic yards of 94 per cent to 96 per cent sludge.

No trouble has been found at any time in drawing off the sludge and it is not necessary to start it by using water from the pipes which were placed around the hoppers for this purpose.

The secondary tank, as has already been stated, foams more or less since the change in method of operating the tanks, and the scum which arises in the gas vents is dipped or shoveled off into wheel-barrows and dumped into a lagoon at the foot of the bank around this tank. This, like the sludge which is drawn off, did not appear to be giving off any appreciable odor at the time the writer visited the plant, and we are informed that there has at no time been any justifiable complaint from this cause. No sludge collects in this secondary tank, all of the suspended matter rising to the surface as scum.

Another rather unusual operating feature of this plant is the elimination of the flies which are found to be such a nuisance in connection with sprinkling filters. Up to a year or two ago this trouble was experienced here also, but at the suggestion of Dr. Thomas Headlee, state entomologist, New Jersey Agricultural Experiment Station, the expedient was tried of flooding the bed by backing up the sewage until it stood about two inches above the surface of the stone, holding it there about twenty-four hours and then drawing it off. This seemed to kill all of the larvae of the flies and by repeating this once a month their breeding in the filter seems to be entirely prevented. When drawing off the filter after flooding, the effluent, of course, is not a purified filter effluent, but within less than twenty-four hours the effluent becomes normal again. To provide for flooding the filters, a dam was built across the main drainage channel into which the subdrains of the filters discharge and a gate provided in this dam, so that it was only necessary to close the gate in order to flood the filter.

FOAM CHIMNEY ON GAS VENT OF IMHOFF TANK.
Scum board which holds back foaming overflow from reaching outlet is shown in foreground.

At construction there was placed in each of the two dosing tanks, an appliance for keeping count of the number of doses discharged during the day and thus of the

INTERIOR OF SCREEN HOUSE.
Part of screen and two brushes in view below floor level; motor which drives screen is seen just beyond railing.

quantity of sewage treated. Some changes in this have been made by Mr. Downes to make its working more reliable, and it now consists of a float in the dosing tank suspended from a wire which passes through the roof of the tank and into a small box attached thereto. Fastened to the bottom of this box is a three-figure counter, and a two-inch cast iron pulley standing in a vertical position. The wire, passing onto and half-way around the pulley, is attached to the top of it, and to the other side is fastened a piece of lead which serves as a counter-weight to lift the wire a short distance when the float rises. On this wire is fastened a small piece of metal which engages with the counter and causes it to register as the counter-weight pulls the wire up. When the tank discharges, the float pulls the wire down and raises the counter-weight again.

In a brick building near the inlet of the plant and similar in appearance to that housing the screen is the office of the superintendent and a well-appointed, convenient and well-lighted laboratory. Here also is a shower bath and dressing room for the laborers. At present, two laborers are employed in the daytime and one attendant at night.

In considering the efficiency of the plant working under trying conditions of the "ripening period," as it is often called, and in appreciation of the up-to-the-minute completeness of the working equipment, one must give due credit to the unstinted support of the Operating Committee. The members of this committee, though serving without compensation, have given the entire afternoon of every second Sunday for three years to meetings at the plant for considering ways and means. That they have shown much foresight and breadth of vision is evidenced by the results. Mr. Downes states that in his fifteen years' experience in water and sewage purification, his experience with this committee is unique.

## FLOATING GARBAGE REDUCTION PLANT.

The large garbage reduction plant which has been operated off and on during the past two years with considerable difficulty, both mechanical and legal, for disposing of the garbage of Greater New York City, has been closed down for some time, following most vigorous protests by the inhabitants of Staten Island, where the plant is located. At present the garbage is being taken to sea in boats and dumped there. The problem of garbage disposal for a large city like New York is much more serious than for a smaller city, both because the enormous size of the plant makes it many times more objectionable than would be the smaller plant required by a medium-sized city, and also because the density of population in almost all of the surrounding territory makes it difficult to find any spot where there are not near neighbors who will protest vigorously (and with considerable political influence) against the location of such a large plant anywhere in their vicinity.

Street Cleaning Commissioner Arnold B. MacStay, who has immediate charge of the disposing of New York City's refuse, is opposed to the cost and waste of materials involved in incineration and is endeavoring to work out a plan by which the city's garbage can be disposed of with some financial return if not at a profit. Chemists have been experimenting with the city's garbage and have worked out plans for treating it by which would be produced chicken feed, a dry and easily handled fertilizer base, and fuel compressed into balls.

The most interesting feature however, is the solution of the problem of location of the plant. Commissioner MacStay says that the city is seriously considering the installation of garbage utilization ships or floating reduction plants, which would pick up the garbage at the water front dumps each day and begin treating it as soon as received. It would probably be hoisted on board in sealed containers and treated so that the entire operation would be without disagreeable odors. It is believed that ships suitable for this purpose can be bought from the Federal government at very reasonable prices. Probably five or more would be required for this purpose.

Mr. MacStay believes that the existing Staten Island garbage plant could be so operated as to be wholly unobjectionable, if about $250,000 were spent in increasing its capacity. Although he did not say so, it is probable that the reason for not immediately deciding upon this is not so much because of the expenditure involved as because of the certainty that any effort to start the plant again would be met by immediate and vigorous protests, injunctions and other moves both legal and political, which would place the city officials in an awkward position and delay the use of the plant indefinitely.

## LAYING CONCRETE PAVEMENT IN FREEZING WEATHER.

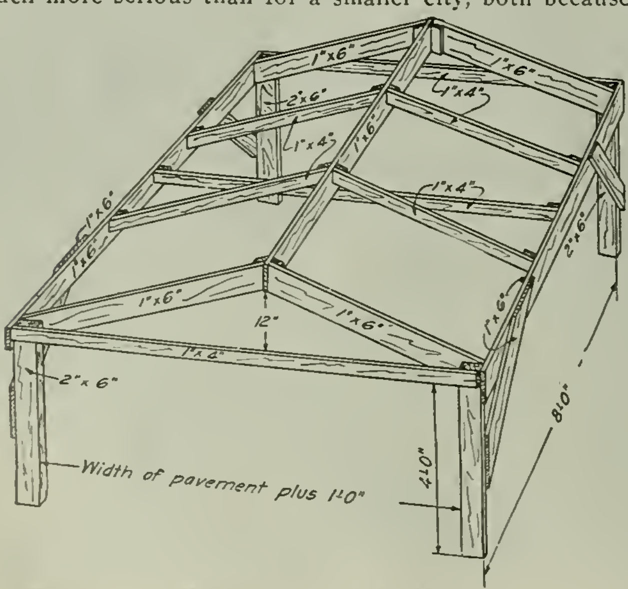
In the coldest parts of the country, almost continuous freezing weather has probably stopped the laying of concrete pavements for the winter; but in the middle latitudes it may still be continued for a few weeks, while further south it may be continued throughout the winter. Some precautions to be observed when the thermometer falls below freezing are given by the Portland Cement Association, the more important being as follows:

Construction of concrete pavements during extremely cold weather is not recommended.

Aggregates and mixing water should be heated so that the concrete, when deposited on the subgrade, has a temerature not less than 80 degrees.

While curing, the loss of heat must be retarded by use of hay, straw or canvas.

For heating aggregates, rotary heaters will pay on large jobs, of the type used for heating aggregates for asphalt paving. Or sand and stone can be heated rapidly by jets of live steam directed into the piles as the materials are loaded into the cars or trucks conveying them to the mixer; but if the haul is long it may be necessary to heat them after they reach the mixer. Where the materials have been delivered along the subgrade ahead of the mixer the piles can be heated by live steam jets or pipe heaters;



FRAME TO BE COVERED WITH CANVAS FOR PROTECTING CONCRETE PAVEMENTS.

the latter usually taking the form of a boiler smoke stack or other length of steel pipe laid on the ground, around and over which the aggregate is piled and inside which a fire is built, using any available fuel. Too great heat must be avoided, as it may injure some materials such as flint and quartz gravel.

For heating the mixing water, the most convenient method is by use of portable furnaces, which contain coils around which the fire is built, through which coils the mixing water passes. Two Londelius heaters used last year on road work near Buffington, Ind., raised water from 40° to 135°, and even to 180°, one for a two-sack batch mixer placing 300 sq. yds. of pavement a day, the other for a mixer of half that capacity. On this work concrete was placed at 75° to 85°, while the air temperature ranged from 4° to 43°.

It is of vital importance that the concrete should not cool below 45 degrees for at least ten days, and the higher it is kept above this the better. If a foot or more of straw is spread on the newly placed concrete and covered with canvas, the initial heat will be retained for some time and frost will not penetrate for weeks if the temperature does not fall very low, especially if snow falls and lies on the canvas. The canvas must be held down by earth banked along its edges or otherwise. Manure should never be used in place of straw, as it stains the concrete and acids of decomposition may pit the surface. Sawdust also may stain the concrete.

Better still, especially when the temperature falls much below freezing, is the use of canvas covered frames placed over the pavement, inside of which burning salamanders, lighted lanterns, or steam coils are placed to supply heat. One such frame was described in our issue of November 15th. Another is shown in the accompanying illustration. The canvas may be supported on a frame composed of 8-inch planks on edge, spanning the road at intervals of about 5 feet, their ends supported on stones or stakes so that they do not touch the concrete, and, resting on the tops of these planks and nailed to them, five or six lines of 4-inch boards laid lengthwise of the road.

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# A STUDY OF BITULITHIC IN SEVEN TEXAS CITIES.

### Result of Investigation by the Texas Engineering Experiment Station—Grading Aggregate—Bitumen—Maintenance—Specifications.

The Texas Engineering Experiment Station was organized in 1914 as a part of the Agricultural and Mechanical College of Texas. It has issued twenty-two bulletins, of which fourteen have dealt with highway subjects. Bulletin No. 22, recently issued, deals with bitulithic pavements in Texas, the information having been "obtained through an investigation of existing bituminous pavements in several Texas cities." The investigation included also sheet asphalt, rock asphalt and Topeka, which will be dealt with in a later bulletin. The discussion of bitulithic "is published separately because of the fact that many of the principles involved in this type of surface are applicable only to this pavement." The following synopsis of the bulletin gives only the general statements and summaries. The sixty pages of the bulletin give details, illustrations, tabulated data and other matter, which will repay study by those specially interested. The investigation was made by Roy M. Green, associate professor of highway engineering, under the direction of J. C. Nagle, director of the experiment station.

There is probably no type of pavement which is so greatly influenced by local conditions as that of bituminous construction, since the success or failure of the work depends not only upon the traffic and climatic conditions, but upon every peculiarity of the materials that may be used. Since more than ninety per cent of the materials forming the pavement are from local sources, it would seem self-evident that each locality has a pavement problem which must be studied and solved more or less independently of what may be done elsewhere.

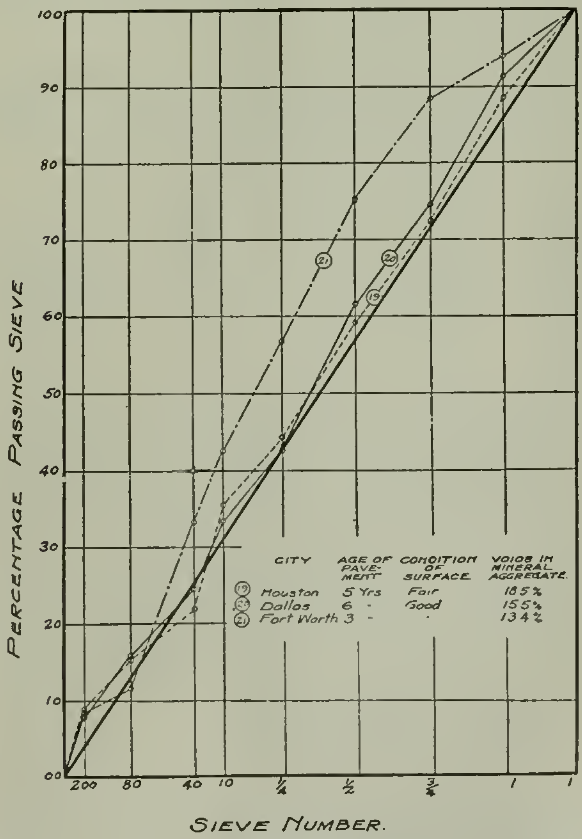
In order that the information might be truly representative of conditions in the state of Texas, and of materials found locally available, samples were obtained from the larger cities of the state, representing the various geographical sections. This made it necessary to obtain the co-operation of the various engineers representing those cities, which was gladly given in all instances.

Samples were selected from the most successful bituminous pavements in several cities of the state. As much information as possible was obtained from the city engineer, concerning the history of the pavements sampled and the materials used in their construction. Also, examples of pavements which have been complete or partial failures were taken, in order to study the difference between them and the more successful ones.

Material as taken from the street was tested for specific gravity, toughness (Page impact machine), and bitumen content; the mineral aggregate was tested for specific gravity, mechanical analysis, and the character of material; the extracted bitumen was examined for bitumen soluble in carbon tetrachloride and insoluble in 86° B. paraffine naphtha, fixed carbon, penetration at 32°, 77° and 115°F., loss by evaporation, 20gm., 5 hrs., 325°F., and penetration after evaporation test, 77°F. From these data were calculated the absolute specific gravity, percentage of voids in the mixture and in the mineral aggregate, and the rational percentage of bitumen.

"Bitulithic, as now constructed, consists essentially of a layer of dense asphaltic concrete, covered, while still hot and before compression, with a mixed seal coat. By this method all the advantages of the aggregate are obtained; that is, the mixture has maximum stability, and none of the disadvantages of the old method are to be found, for the large aggregate is protected from the wear of traffic by the mixed seal coat and the surface is made as nearly water proof as possible."

The desirability of using a hard and tough stone cannot be emphasized too strongly, both because internal



MINERAL AGGREGATE PLOTTED ON THE IDEAL BITULITHIC GRADING.

wear is thereby reduced and also because the absorption of water by the aggregate is decreased.

*Grading of Mineral Aggregate.*—In addition to being tough and hard, the large aggregate must be graded in size so as to give the maximum density, as this will also give the greatest stability to the mixture. This more or less stable mixture of large aggregate should be embedded in a bituminous mortar of such proportions that it will reinforce the large aggregate, prevent internal wear as much as possible, and at the same time produce a waterproof mixture. The proportions of such a mortar are the same as that for the standard sheet asphalt mixture for heavy traffic, as such a mixture is sufficiently rigid to withstand the distorting action of traffic and at the same time furnishes a waterproof surface.

The ideal bitulithic grading would then be one composed of a large aggregate (above the 10-mesh sieve) conforming to Fuller's curve for maximum density, and a fine aggregate conforming to the standard sheet asphalt grading for heavy traffic. Based upon the foregoing principles, such a grading would be as follows for an aggregate having a maximum size as indicated in each case:

| Maximum size of aggregate | ¾" | 1" | 1¼" |
|---|---|---|---|
| Passing 200-mesh sieve | 5.1 | 4.8 | 4.5 |
| Passing 80-mesh and retained on 200-mesh sieve | 10.3 | 9.6 | 9.0 |
| Passing 40-mesh and retained on 80-mesh sieve | 13.6 | 12.8 | 12.0 |
| Passing 10-mesh and retained on 40-mesh sieve | 6.4 | 5.9 | 5.6 |
| Passing ¼-inch screen and retained on 10-mesh sieve | 16.8 | 13.3 | 11.5 |
| Passing ½-inch and retained on ¼-inch screen | 23.9 | 17.8 | 14.4 |
| Passing ¾-inch and retained on ½-inch screen | 23.9 | 17.9 | 14.4 |
| Passing 1-inch and retained on ¾-inch screen | .. | 17.9 | 14.3 |
| Passing 1¼-inch and retained on 1-inch screen | .. | .. | 14.3 |

In order to compare the grading of the mineral aggregate in the various samples with the ideal grading given above, it is necessary to group them according to the maximum size of particles found in each. The comparisons can best be made by the use of the plotted curve.

In studying the grading of the aggregate there are three important factors to consider: namely, first, percentage of 200-mesh material; second, percentage of material passing the 80-inch mesh sieve and retained on the 200-mesh sieve, and, third, percentage of material retained on the 10-mesh sieve.

*Absorption of Water.* — A bitulithic wearing surface mixture has a higher specific gravity and lower percentage of voids than any other bituminous mixtures on account of its high percentage of stone. Regardless of this high specific gravity and low percentage of voids, it absorbs water more readily than any other type of surface, unless the surface is effectually covered by means of a mixed seal coat. Since water has a very destructive effect on all bituminous materials, this fact becomes a very important factor in governing the life of such a pavement.

In order to reduce the absorption of water to a minimum it is necessary to have sufficient bitumen in the mixture to thoroughly coat all particles. Great care should also be used to select a large aggregate which will absorb the least amount of water, and the aggregate should be carefully graded so that the voids in the mixture are as small as possible. In addition to these precautions it is absolutely necessary to keep the top surface covered with a mixed seal coat at all times.

Test cylinders of bitulithic, Topeka mix, sheet asphalt and Uvalde rock asphalt, cut from existing pavements and stored in water for a month, showed absorption in pounds per square yard as follows: One day—bitulithic, .1755; Topeka, .1174; sheet, .0957; rock asphalt, .0310. One month—bitulithic, .3055; Topeka, .4421; sheet, .4233 rock asphalt, .1280. After being in water one day and in dry air for one day, they retained .213, .0128, .0137, and .0000, respectively, in the above order.

Of 32 samples of bitulithic tested, the percentage of voids varied from 12.1 to 20.5, or less than 21 per cent, the maximum set by the tenth claim of the bitulithic patent. Also, in nearly all samples of Topeka mix tested, the voids were below 21 per cent.

Additional points were the following:

Much of the large aggregate now being used in bitulithic construction is very poor, therefore the quality of stone should be specified for all future construction.

The toughness and malleability of the bituminous mortar are influenced by the percentage of filler.

### GENERAL CONCLUSIONS.

The conclusions concerning the bitumen were summarized as follows:

*Bitumen.*—1. The logical way to determine the correct percentage of bitumen to be used in any mixture is to separate the aggregate on the 10-mesh sieve and determine the percentage of bitumen which is necessary to coat each part. The results obtained from such determinations furnish sufficient information to calculate the correct percentage of bitumen to be used in the finished product.

2. The percentage of bitumen usually given in typical specifications in various text-books is excessive.

3. A reasonable limit for the percentage of bitumen to be specified is from 5 to 8 per cent.

4. No particular brand of asphalt is so much superior to others that a city is justified in eliminating all materials with the exception of one by means of closed specifications.

The other points are summarized under three heads:

*Seal Coat.*—1. A seal coat of appreciable thickness is necessary in order to keep a bitulithic pavement in such a condition that it will be able to withstand the action of traffic for a long period of years.

2. The original flush coat method of sealing the top surface is only of value for a short time, as the aggregate used in it is soon swept away. It does not protect the large aggregate from the shocks of traffic because of its small depth.

*Maintenance.*—1. The causes of deterioration of bitulithic pavements which may be guarded against by proper maintenance methods are usually the results of surface wear or the action of water on the mixture.

2. The maintenance method commonly used to protect a pavement from surface wear, known as "Double Reflushcoating," is of value only for a short while. A better method would be to seal-coat the surface with the same type of seal coat as is now used in the original construction.

3. Hand samples of the pavement should be obtained as often as possible so that the condition of the surface may be known at all times and the destruction of the pavement due to internal conditions be guarded against.

*Specifications.*—1. The present specifications for bitulithic are not satisfactory because they do not describe the materials that are to be used, nor the finished pavement that is to be produced. They also take the responsibility for success out of the hands of the city engineer, who must again be given the responsibility for their condition after the expiration of the guarantee period.

2. The properties of the aggregate should be described in the specifications in order to insure successful results.

3. The properties of the asphalt cement to be used in the pavement should be described in the specifications.

4. The formula to be used in the construction of the pavement should be given, rather than simply to have the properties of the finished pavement described in relative terms, as is now the case.

5. The "Mixed Seal Coat Method" should always be specified in prefernce to the old "Flush Coat Method."

6. A guarantee should not be expected of the contractor, as it damages rather than benefits the city and is not fair to the contractor.

## BITUMINOUS MACADAM VS. CONCRETE PAVEMENTS.

In August last F. S. Greene, New York State Commissioner of Highways, published in one of the engineering periodicals an article citing cost figures from the records of his department, and stated his conclusion that "From all available data, there is no doubt that at the end of 8 or 10 years of service, depending upon the amount of traffic, the concrete pavement is the most economical one that can be constructed." This conclusion is discussed below by F. P. Smith, of the firm of Dow & Smith, consulting paving engineers and chemists.

Editor, Municipal Journal and Public Works,
New York City.
Sir:

An article has been written by Commissioner Greene, of the New York State Highway Department, comparing the cost of concrete and of bituminous macadam pavement to the great advantage of the former, which article has been quoted in a number of technical papers.

1. In this article he cites excerpts from New York State statistics to prove the high cost of maintenance of macadam highways, but, unfortunately, does not very clearly differentiate between water-bound and bituminous macadam. Most of his bituminous macadam statistics cover a period of six and a half years.

2. Based on these data he concludes that both water-bound and bituminous macadam are unsuitable on through routes in New York State.

3. He next cites the cost of repairs to concrete roads in New York State during a much shorter period, computed from statistics admittedly covering a much smaller mileage.

4. This is followed by a comparison of costs of construction and maintenance of the three types mentioned.

5. His conclusion is as follows: "From all available data, there is no doubt that at the end of eight or ten years of service, depending upon the amount of traffic, the concrete pavement is the most economical one that can be constructed."

It has been conclusively demonstrated that water-bound macadam roads will not sustain heavy automobile traffic and that the cost of maintaining them under this kind of traffic is prohibitive. This conclusion is generally accepted by engineers and is concurred in by the writer and no attempt therefore will be made to discuss in detail his water-bound macadam figures. I feel, however, that Commissioner Greene's statistics on which he states that his conclusions are based are very misleading and should be carefully weighed and analyzed before his conclusions are accepted.

Maintenance charges for any type of pavement are of little value unless coupled with a record of the kind and density of traffic. This information is not given in connection with the tabulated cost and maintenance data on which Commissioner Greene's calculations are based, nor does he distinguish between water-bound and bituminous macadam. In order to make such distinction, the writer has consulted the New York State records, from which he has obtained the information given below concerning the individual roads cited by the commissioner.

The selection of the bituminous macadam pavements for the comparison is manifestly unfair. Of the 46.13 miles cited, more than 40 per cent have been reconstructed or resurfaced, while of the entire 3,000 miles in the state highway system, only about 100 miles, or 3½ per cent, have required such treatment. The maintenance cost of the pavements cited is given as $1,455.99 per mile per year, but the average annual appropriations for maintenance of all roads have averaged just about half this sum, and those for bituminous macadam only about one-third of it.

The roads selected, therefore, are far from average or typical. Some were poorly designed or constructed (as are some roads of concrete or any other type). Of the 13 roads cited, 5 were destroyed by the unprecedently severe use given them by the army truck trains which traversed the state in the spring of 1918, while the frost was coming out of the ground. Of $218,080 total costs charged to maintenance of such roads, $186,734 was for reconstruction to repair the damage just referred to; leaving for maintenance only an average of $309 per mile for the six-year period under normal traffic. Most of the other eight were resurfaced within two or three years of acceptance, because of insufficient drainage or foundation. If these reconstruction costs be deducted, the average maintenance charge amounts to only $511.95 per mile per year.

Another instance of unfair charge is a 7.77-mile road on which $20,000 was spent in 1917-18 for widening it five feet and banking curves—surely not a fair charge against maintenance. Another case is that of three sections aggregating 13.56 miles, of which 8.71 miles was concrete pavement with a bituminous carpet which required excessively high maintenance and was resurfaced with asphalt macadam at a cost of $54,109, which was included in the maintenance charge of $104,030.80.

In making his comparison, the commissioner states that the cost of maintaining bituminous macadam is approximately $600 per mile per year, and that of concrete $100; while the annual report of the commission dated January, 1918, gives the costs for 1915-16-17 as $464 and $124 respectively. It is not apparent how the commissioner's statement can be reconciled with these official figures.

As regards the figures, the relatively low cost of upkeep of concrete roads is more apparent than real. In 1917 the concrete roads in the state had been laid only one to three years, averaging eighteen months, and the average outlay on any properly constructed road during the first year is very small. On the other hand, the bituminous roads had been in service for from one to eight years, averaging four—almost three times the average age of the concrete roads. The maintenance cost of the bituminous macadam roads included resurfacing some of them, but the concrete roads had been in use such a short time that no resurfacing had been needed. It is a known fact, however, that very few concrete roads have been in service for over six years without resurfacing.

Another point to be considered is that when concrete roads were first constructed, the heavily traveled routes had already been surfaced with bituminous macadam, and concrete was laid only on the more lightly traveled lateral roads.

As the commissioner has used, in his comparison, bituminous macadam projects upon which the maintenance charges were several times the average for the entire state system, it would seem pertinent to cite concrete pavements whose maintenance has been high:

| County | Road Number | Length, Miles | Improvement Completed | Total Maintenance |
|---|---|---|---|---|
| Livingston .... | 5273 | 6.28 | 11/12/13 | $44,164.76 |
| Livingston .... | 5302 | 6.40 | 1/15/14 | 64,340.19 |
| Onondaga ..... | 672 | 6.45 | 1/25/14 | 49,002.52 |
| Onondaga ..... | 971 | 7.69 | 1/25/14 | 54,228.52 |
| Onondaga ..... | 1039 | 11.10 | 10/10/13 | 53,241.68 |
| Onondaga ..... | 5249 | 4.84 | 12/27/12 | 54,121.26 |
| Onondaga ..... | 5274 | 10.51 | 10/24/13 | 62,514.18 |
| | | 53.27 | | $382,613.11 |

The average cost of maintenance of these concrete pavements was $1,407 per mile per year, compared with the $1,456 for the bituminous macadam projects used by the commissioner.

As to construction cost, of proposals received by the commissioner this year, those for concrete run $12,000 to $15,000 a mile higher than those for bituminous macadam, instead of the $7,000 estimated by him. Using these figures, with those for maintenance given by the report ($464 and $124 respectively), although the latter admittedly favor concrete, we have

| | First cost per mile | 4% Interest 7 years | Maintenance 7 years | Total Cost |
|---|---|---|---|---|
| Bituminous macadam.. | $20,000 | $5,600 | $3,248 | $28,848 |
| Concrete .............. | 35,000 | 9,800 | 868 | 45,668 |

The writer believes that the service records of concrete roads prove that they require resurfacing at least once in seven years, as opposed to Commissioner Greene's opinion, totally unsupported by any service record, that "first class concrete roads as now laid will last at least fifteen years before resurfacing is necessary" and his other belief, also unsupported by any service records, that "we can now build reinforced concrete roads which will last certainly for twenty-five years." From 1908 to 1918 the State of Maryland built 285 miles of concrete roads, and J. M. Mackall, chief engineer of the State Roads Commission, says that, "when constructed to maintain heavy traffic, they will require resurfacing and for this work we believe that two-course sheet asphalt pavement is by far the most satisfactory." And concerning the Washington-Baltimore boulevard, he says: "I do not believe any concrete pavement would withstand this traffic for a period greater than ten years." In their twelfth annual report, the supervisors of Wayne County, Mich., state that "the entire mileage of concrete roads of the county has been gone over one or more times this year with tar, torpedo sand and granite chips, making the necessary small surface repairs and tarring the joints and cracks."

In 1909 (when New York State built its first bituminous macadam pavement) and 1910, about 300 miles of this type was constructed, and only about 9 per cent of this has been resurfaced or reconstructed, although some of it was admittedly imperfect. Of 730 miles built in 1911 and 1912, 6½ per cent has been resurfaced or reconstructed. Of this 1,030 miles of bituminous macadam having an average age of seven years, only a little over 7 per cent has been resurfaced or reconstructed. It is, therefore, difficult to understand how the commissioner could feel justified in stating that the average life of this type of pavement is seven years and "cannot be reckoned beyond ten years."

Commissioner Greene estimates the cost of resurfacing concrete at $16,700 per mile, giving the total cost at the end of seven years as $62,368. The commissioner's contention that it is necessary to lay a new two-course bituminous macadam 7 inches thick every seven years is absurd, since it is well known that a surface treatment of heavy oil and stone chips about once in three years restores the material worn away by abrasion. The practice of the New York State Department has been to resurface the older pavements with a new asphalt macadam top 3 inches thick, and during the years 1915 to 1917 the average cost of this was $6,250 a mile. Assuming it would cost $8,000 per mile at present prices, fourteen years' interest and maintenance, including resurfacing, would give a total of $43,946 for bituminous macadam and $73,036 for concrete—a showing greatly in favor of the former.

Another argument in favor of bituminous concrete is that, with the same expenditure, if concrete had been specified for all New York State highway work there would now be not over 4,000 miles of improved highways instead of the 7,400 miles now in use.

There are certain conditions of subsoil or traffic for which bituminous macadam is not the best type, but the experience of New York City with Fifth avenue, which is paved with a 1½-inch sheet asphalt surface, 1½-inch binder and a 6-inch concrete base, indicates that for the heaviest traffic such a pavement, at $2.50 a square yard, would cost $23,477 a mile for a 16-foot road and not over $150 per mile per year for maintenance over a five-year period. During the war the average cost of maintaining such pavements in Washington, D. C., averaged about $159 per mile of 16-foot roadway. Such a pavement can be completely resurfaced for about $11,800 and it would be ultra-conservative to estimate that resurfacing need not be done oftener than once in seven years. On this basis, such a pavement would cost $37,374 per mile for a fourteen-year period, including interest, maintenance and resurfacing. Such a pavement on a properly drained sub-base would carry the heaviest motor traffic without injury to the foundation and would be especially suitable in localities where repair facilities were obtanable.

The commissioner compares the ultimate cost of concrete roads averaging 7 inches in thickness with bituminous macadam roads, many of which consisted of 3 inches of wearing surface on 6 inches of rolled broken stone base—a construction which the writer protested very strongly against in 1909; instead of comparing them with standard sheet asphalt or any approved form of hot mix bituminous surfacing or even penetration surfacing on an adequate foundation. Such standard bituminous pavements have demonstrated that under severe conditions they would have a life of seven years or more, which is as great as can be claimed for concrete on the basis of any service records in existence.

As to the claim that it is economical to build a concrete roadway and, when it needs resurfacing, cover it with an asphalt wearing surface, this practice is not economical, for in order to withstand the shock of heavy traffic the concrete road should be much thicker than a concrete base with an asphalt surface to absorb the shock, and in addition it is necessary to use a much richer and more expensive mixture in a concrete road than in a foundation. The first Biennial Report of the California Highway Commission states: "Regardless of the overladen trucks, it seems apparent that the concrete base should in all cases have the bituminous tops applied as soon as it can be done. The original idea of the commission, that bare concrete is not a fit material to receive the impact of heavily loaded vehicles, still appears to be sound. Even the thin bituminous carpet is of great aid in distributing the impact."

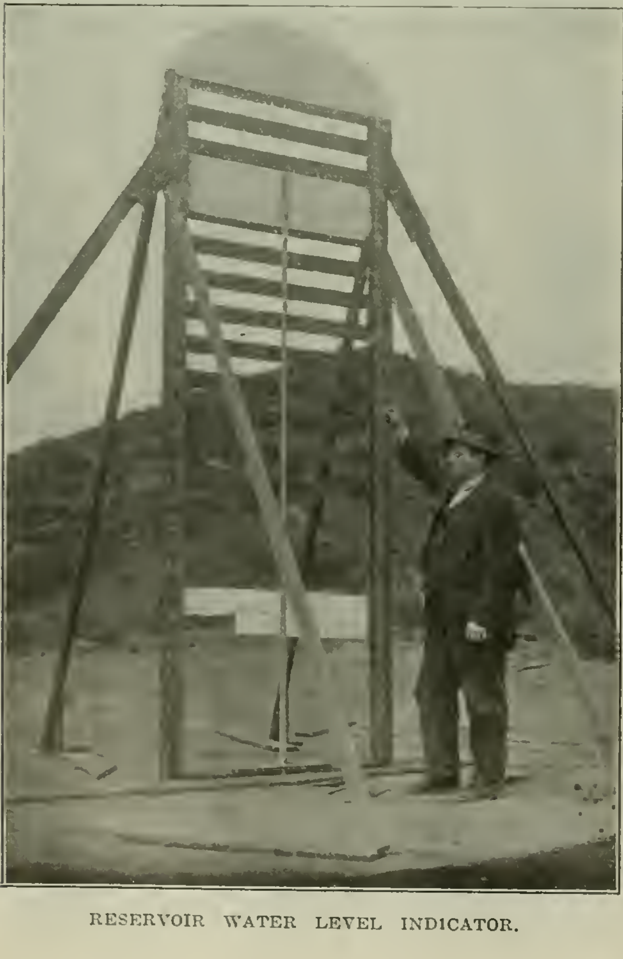
Moreover, by the time the concrete road must be resurfaced, it is far inferior as a foundation to a freshly constructed and cheaper concrete base, as it is cracked to a very considerable extent and probably has numerous surface defects.

Yours truly,
FRANCIS P. SMITH.

## A RESERVOIR WATER-LEVEL INDICATOR.

The reservoir of the municipal water system of Hollywood, California, is located some distance from the pumping station, on a hill which is very difficult of access. There being no height recorder installed, it has been necessary to make one or two trips to the reservoir each day to ascertain the depth of water in the reservoir.

To remedy this, the engineer has erected on top of the reservoir the indicator shown in the accompanying photograph, so located that it can be seen readily from the pumping station. It consists of two posts about twelve feet high, braced in vertical position and connected by horizontal slats. These slats are so spaced that each interval between them represents 10,000 gallons in the reservoir. A float in the reservoir is connected by a vertical rod with a broad white board, which rises and falls in front of the slats as the water level changes.


RESERVOIR WATER LEVEL INDICATOR.

## AUTOMOBILE FATALITIES.

Ten thousand people a year are killed in automobile accidents in the United States! This was the figure for 1917, and it probably is not less this year. The rate per million of population runs more than twice as high in cities as in rural sections, and the reduction of this high rate is therefore largely a problem for the cities.

That it can be reduced is shown by facts and figures. New York City regulates its traffic more carefully than any other city, and in spite of the crowded condition of its streets its rate of automobile accident fatalities is lower than that of almost any other large city. In 1917 the rates per million population were 92.4 in New York, 93.7 in St. Louis, 112.2 in Providence, R. I., 122.5 in Chicago, 127.8 in Baltimore, 150.4 in Newark, 152.3 in Washington, 165.6 in San Francisco, 172.3 in Buffalo, 248.5 in Detroit, and 281.5 in Pittsburgh. Detroit's rate was lowered to 197.8 in 1918 through a campaign inaugurated by the National Safety Council. Pittsburgh, by a similar campaign, lowered its rate 17 points in 1918, although it had been increasing from 10 to 174 points a year previous to that.

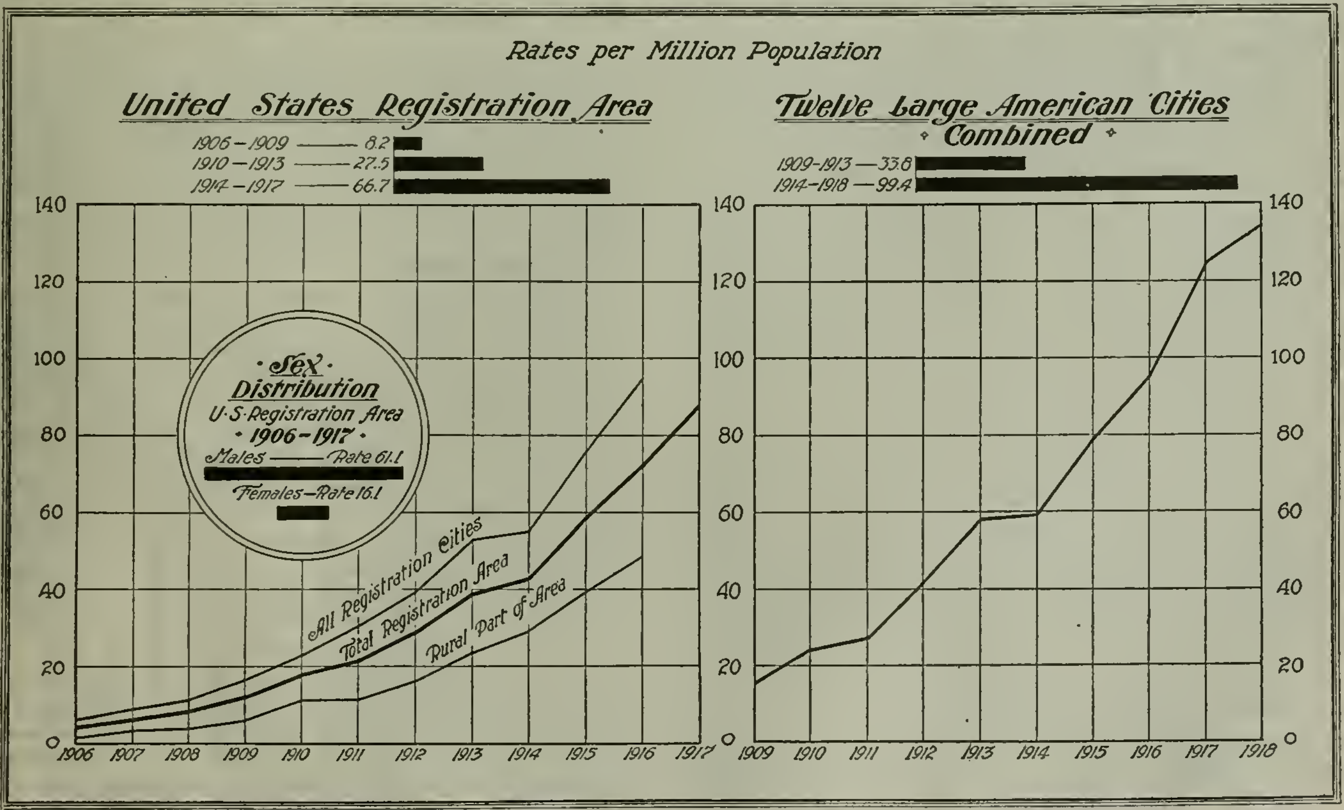
The accompanying diagram shows how the rate has been increasing continuously, being about ten times as large in 1918 as it was in 1908. In the cities of the registration area the number of fatalities increased more than fifteen fold in ten years. Certainly the point has been reached when something should be done not only to stop the increase in rate, but to force it down. If education and traffic regulation will not do it, it may be necessary to provide special features of construction at points of unusual danger—gates to control vehicular traffic, curb fences to prevent pedestrians crossing the roadway between corners, overhead or subway crossings, etc. Each of these ideas has been employed under certain conditions, but a general adoption of them would be very expensive. Even so, when one city is losing more than a thousand citizens a year from this one cause, an expenditure of even two or three million dollars a year to cut the rate in half is warranted from a mere dollars-and-cents point of view, considering each life worth $5,000.

## GUARANTEES FOR PAVEMENTS.

In the issue of Municipal Journal for March 8, 1919, we published a report of the "Committee on the Economic Status of Guarantees for Pavements on Roads and Streets" of the American Road Builders' Association. At the annual meeting of this organization in November, 1919, this committee presented a final report, supplementing its previous report by a discussion of the criticisms and suggestions which had been elicited by the former report and recommending certain changes suggested therby.

It had been suggested that the committee indicate what it considers a proper period of "reasonable life without repairs" for various kinds of pavement under different conditions. An effort to compile a table covering all possible conditions showed that the wide variations involved would render the figures worthless. "Each set of conditions must be given individual consideration, and the committee believes that the determination of such reasonable periods in any particular case would not be extremely difficult and that any competent engineer can do this satisfactorily."

Several members had objected to the committee's recommendation that the guarantee bond be supplemented by a cash retainer. The committee defends this recommendation by stating that, as a rule, a municipality has no fund available for repairs and the cash retainer therefore serves two purposes—(1) It tends to bring the contractor back to make the repairs, as he knows he will collect some money toward the expense involved. (2) It gives the municipality cash with which to make the repairs and thus avoids the necessity of going through the



MORTALITY FROM AUTOMOBILE ACCIDENTS, 1906 TO 1918.

formalities and oftentimes the difficulties of securing an appropriation, with all the attendant delays.

On further consideration, the committee believed that reasonably adequate protection would be assured by retaining 5 and 8 per cent on new construction and resurfacing, respectively, instead of the 10 and 20 per cent originally recommended. The committee takes the position that 15 cents per square yard to cover guarantee liabilities may be assumed as a fair average. This sum would result from retaining 8 per cent on a total resurfacing cost of $1.80 per square yard, or 5 per cent on a total cost for new work of $3.00 per square yard; these differences in cost explaining the different percentages retained, both giving the same sum of 15 cents. It assumes that the contractor would add this 15 cents to his construction cost plus 10 per cent profit in the bid he makes to the municipality. This sum therefore would not be retained from moneys which had yet to be earned by the contractor or from payments made by him. It cannot therefore be justly held that retaining this sum is a curtailment of the contractor's working capital. This amount, while sufficient to cover ordinary defects in workmanship and insure the making within a reasonable time of necessary repairs, would be totally insufficient to cover extensive repairs rendered necessary by serious defects or failure of the work, and protection against these would be assured by the guarantee bond.

The committee conceded that the criticism of its provision for forfeiture of all retained moneys in case of failure to make ordered and necessary repairs is too drastic, and modified its report by providing that the city may make these repairs at the expense of the contractor and deduct such expense from the retained money; recovering from the securities any amount by which the cost of such repairs may exceed the amount of retained money.

The committee consisted of Francis P. Smith, chairman, J. J. Hill, C. M. Pinckney, J. H. Wait and T. J. Wasser.

## WATER PURIFICATION AT NEW ORLEANS.

The annual report for the year 1918 of the Sewerage and Water Board of New Orleans has recently reached this office, and from it we have selected some of the most interesting facts and figures which are given herewith.

The revenues from water rates amounted to $713,949.60. This was an increase of $114,000 over 1917, the increase being due to revision of regulations as to free allowance of water for sewerage and allowance for leaks and to an increase in the use of water by various federal government departments. But this increase was fully equaled by the increase in cost of labor and material required for operation and maintenance.

As the year 1918 closed the first ten years of operation of the water purification stations, tables were given summing up the operating figures for this period. Among the figures for this period are the following: Turbidities—maximum: river, 3,000; effluent of grit reservoir, 2,150; effluent of coagulating reservoir, 1,700; filter effluent, 45 (abnormally high, due to freeze in 1918). Minimum: river, 30; effluent of grit reservoir, 35; effluent of coagulating reservoir, 1; filter effluent, 0. Average: river, 600; effluent of grit reservoir, 550; effluent of coagulating reservoir, 32; filter effluent, 0.

Alkalinities—maximum: river, 192; effluent at coagulating reservoir, 88; filter effluent, 99. Minimum: river, 50; effluent of coagulating reservoir, 25; filter effluent, 20. Average: river, 97; effluent of coagulating reservoir, 45; filter effluent, 38.

Incrustants—Maximum: river, 50; filter effluent, 53. Minimum: river, 5; filter effluent, 6. Average: river, 19; filter effluent, 23.

Bacteria—Maximum: river, 41,000; effluent of grit reservoir, 50,000; effluent of coagulating reservoir, 12,000; filter effluent, 3,200. Minimum: river, 95; effluent of grit reservoir, 40; effluent of coagulating reservoir, 5; filter effluent, 1. Average: river, 2,300; effluent of grit reservoir, 2,200; effluent of coagulating reservoir, 475; filter effluent, 25.

At the large station, known as Carrollton, the total cost of operation for the year 1918 was $8.43 per million gallons, of which $3.07 was for attendance and supervision; 28 cents for labor unloading, crushing and storing chemicals; $3.75 for lime, 75 cents for iron and 11 cents for liquid chlorine; 20 cents for supplies and miscellaneous and 27 cents for labor and material furnished by the pumping station. In addition, $8,780 was spent in the care and maintenance of the parks and grounds. Wash water, including all pumping costs, cost 6.8 cents per million gallons of water filtered. The cost of all water for cleaning reservoirs was 9.2 cents per million gallons of water filtered, excluding treated water which was wasted in draining the reservoirs for cleaning. Adding the cost of pumping, the net cost of filtered water pumped was $20.50 per million gallons.

The total gross cost of delivering filtered water to the distribution system, at the plant, exclusive of interest and depreciation charges and based on quantities actually delivered, was $20.76 per million gallons, or $22.53 if the betterments and care and maintenance of the park and grounds are included. None of the above figures allow for interest, depreciation or general and overhead expenses.

At the smaller station, known as the Algiers, the cost of treatment was $24.61 per million gallons, of which $17.10 was for labor, attendance and supervision and $5.90 for chemicals.

Cleaning the reservoir cost $3,925, or 33.1 cents per million gallons of water treated, or 8.4 cents per cubic yard of dry material removed. The amount of wet mud removed was 140,000 cubic yards, estimated to be equivalent to 47,000 cubic yards of dry material. In cleaning, there were used 41,000,000 gallons of raw water, 55,000,000 gallons of treated water, and 8,000,000 gallons of filtered water. The labor employed in cleaning the reservoir system totaled $2,855.

A table was given showing the average chemical and bacterial composition of the Mississippi river water before and after softening and purification. There was no change in the free ammonia, nitrites and nitrates, chlorine, oxygen, alumina, sodium or potassium. Albumenoid ammonia was reduced from .350 to .035; oxygen consumed from 7.01 to 1.5; alkalinity from 97 to 41; incrustants were increased from 22 to 25. Suspended solids were reduced from 650 to 0; dissolved solids from 190 to 100; half-bound carbonic acid from 42 to 0; free carbonic acid from 8 to 0; color from 10 to 5; turbidity from 600 to nothing; silica from 11 to 10; iron oxide from .13 to .05; calcium from 38 to 15; magnesium from 8 to 3; sulphuric anhydride increased from 19 to 21. Before treatment there was a very slight earthy odor, but none whatever after treatment. The bacteria per c.c. on gelatin 20 degrees, 48 hours, were reduced from 2,600 to 31 between the years 1909 and 1913. Since then, agar 37 degrees, 24 hours, has been used and the bacteria on this basis reduced from 1900 to 17.

# The WEEK'S NEWS

**Spending Michigan's $50,000,000 Road Fund—New England Has Weekly Weather Road Map—Pennsylvania to Keep Roads Open—Border Guarded Against Smallpox from Canada—Mileage of Sewers in Pennsylvania Cities —Richmond, Ind., Water Rates Increased—Detroit to Classify City Employes—Illinois Taxes Bridge of St. Louis, Mo.—Valuation of Pittsburgh Street Railways—Chicago Fighting for Five Cent Fare and City Ownership of Street Cars.**

## ROADS AND PAVEMENTS

### Financing Michigan's New Highways.

Lansing, Mich.—Issuance of another $2,000,000 in short term notes by the state for use of the highway department in the big road building program has been authorized by the state highway loan improvement board. This will make a total of $4,000,000 in state securities issued under the constitutional amendment adopted last April, which enables the state to expend $50,000,000 for the improvement and construction of trunk line roads. They will be due in four months after date, and at that time will be paid from the proceeds of long-time bonds to be issued early in the spring. The state highway department is now paying for the work done this year. Probably 85 to 90 per cent of the road contractors are completing their work now and are anxious to get their money. The $500,000 worth of state notes issued some time ago have been taken up, being paid from the sale of the $2,000,000 worth of highway bonds sold. State treasurer Gorman plans to issue $3,000,000 of these bonds next spring, which will round out the $5,000,000 which it is planned to expend each fiscal year until the road building program has been completed. After the first of the year one-half of all automobile license money which goes to the highway department for road improvement and building, will begin to come in, so there will be no shortage of funds at any time. This source netted the highway department more than $1,600,000 for the last year.

### Weather Road Map for New England.

Boston, Mass.—The first weekly weather road map and data relating to the condition of highways throughout New England, has been issued from the Boston branch of the Weather Bureau. It indicates much work in putting out information which should prove of great value to pleasure and business traffic. Practically all main routes of traffic from Maine to Rhode Island have been covered in the summary of prevailing conditions of highways, while there also is forecasted the probable conditions of roads for the weekly period. The new service consists of a map of New England, forecast and present condition of highways. During the winter the amount of snow in different sections will be designated by clear spaces, where the covering of snow is less than four inches; single lines where the snow is four to eight inches deep and criss-cross lines where the depth is more than eight inches. The first map has no cities to help give a more definite idea of locations, but the chief cities of New England will be marked in succeeding maps. Reports are grouped first by states and then as lines radiating out from the most prominent cities in these states, and then listed from these cities clockwise to compass directions. All through lines run from Boston. Main-traveled highways only, as suggested by the respective highway commissions, are reported.

### Main Pennsylvania Roads to Be Kept Open.

Harrisburg, Pa.—The state highway department has announced that it has completed plans whereby all of the main connected hard-surfaced highways will be kept open for winter traffic, particularly those sections where motor trucks can be used for the transportation of farm products to the centers of population. The department has issued the following statement: "From experience gained during the severe winter of 1917 and 1918, the department made extensive plans to take care of snow removal operations during the season of 1918 and 1919. The intention was to use snow plows attached to department trucks, as well as road machines and wooden drags. However, it was necessary only once during the winter of 1918 and 1919 for the department to attempt snow removal. For the coming winter's operations the department has purchased ten snow plow truck attachments in addition to the sixteen already on hand. There are 225 road machines, property of this department, which will be transferred to the main lines of travel. The district organizations will handle this phase of the work, as they do the department's general maintenance operations. We are transferring our truck equipment to those particular highways which must be opened as quickly as possible after a snowfall. The road machines will be used on highways of secondary importance and supplementing the truck equipment. There is a caretaker on each section of from five to six miles in length, and he is given authority to hire additional labor if circumstances warrant."

## SEWERAGE AND SANITATION

### Court Says Tuberculosis Hospital is Not Health Menace.

New Orleans, La.—In a suit to enjoin the city from establishing and maintaining a tuberculosis hospital in the city, one of the objections of the plaintiffs, who lived in the vicinity of the proposed site, was that the hospital would endanger their health. The state supreme court did not take this view. The court said in part: "If it were proved with certainty that this hospital would endanger the health of this plaintiff or his family, perhaps a case might be presented for judicial interference. But the very opposite is conclusively shown by the evidence, which is all one way to the effect that a well-kept tuberculosis hospital is not a menace to the health of the people living in its vicinity; and the presumption is that this hospital will be well kept. * * * Our conclusion is that the suit is groundless in so far as it is sought to be founded on the apprehended injurious character of the proposed hospital."

### Border Quarantine Against Smallpox from Canada.

Niagara Falls, N. Y.—W. R. Baldwin, immigration officer in charge of the Niagara Falls immigration bureau, has received orders to enforce the border quarantine which has been declared by the United States Public Health Bureau on account of the prevalence of smallpox in Toronto, and other cities of the Province of Ontario. C. H. Gardner, surgeon of the United States Public Health Bureau, in Buffalo, announced the quarantine. A staff of physicians and nurses has been stationed at the immigration offices at the American ends of the bridges, as well as at headquarters office at the Tenth street railroad station. According to Inspector Baldwin's announcement, "every person traveling from Ontario to the United States must show either a certificate of recent vaccination or that he has had the disease. Certificates to be valid must be on the printed stationery of the physician issuing them or be issued by the government of the city under whose authority the vaccination was done. Travelers from the United States in to Canada and back should be vaccinated before starting from this side. Vaccination will be performed free of charge at the immigration offices at the American ends of the bridges and at our headquarters office at the Tenth street station. Persons living in non-infected cities of Ontario, who have frequent business in the border cities of the United States can, upon establishing their identity, be provided with identification cards permitting them to cross the border wthout being subject to the vaccination order. Such cards are invalidated, however, by a single visit to an infected city." The announcement of Dr. Gardner sets forth that through passengers come from points in the United States through Canada to other points in the United States who do not get off the train in Canada will be passed on their through tickets. Persons living in the United States and having frequent business in Canada to points not infected will be able to arrange for identification cards with the immigration officers at the border, the cards to be made in triplicate and a passport size photograph in triplicate provided. It is reported that there are about 4,000 smallpox cases in Ontario.

### Forced Closing During Epidemic Held Invalid.

Paterson, N. J.—Measures taken during last year's influenza epidemic in closing saloons have been declared invalid. The defendant was convicted in the lower court for inviting and allowing people to congregate in his saloon while influenza was epidemic in the city, it being charged that such action was dangerous to human life and health. The section of the ordinance under which he was convicted read as follows:

> That whatever is dangerous to human life or health, whatever building, erection, or part or cellar thereof is not provided with adequate means of ingress and egress or is not sufficiently supported, ventilated, sewered, drained, cleaned, or lighted, and whatever renders the air, food, or water unwholesome, are declared to be nuisances and are prohibited. Any person violating any of the provisions of this section shall be liable to a penalty of not less than $5 nor more than $100.

The Supreme Court of New Jersey decided that the ordinance was too indefinite to support the conviction, and that the complaint in the case charged no violation of the ordinance. Legal enactments specifically requiring the closing of schools and places of amusement during an epidemic have been upheld by the courts, according to the U. S. Public Health Service, which finds in this case an example of the necessity for drafting health legislation in a clear and definite form.

### Sewer Mileage in Pennsyvania Cities.

Harrisburg, Pa.—According to a report just compiled by J. Herman Knisely, chief of the bureau of municipalities of the Department of Internal Affairs, Reading leads the third-class cities of Pennsylvania in the matter of miles of constructed sewers, having a total of 180 miles. Coatesville, a much smaller city, has the least, with 7.5 miles. Most of the cities of the third class have both sanitary and storm sewers, constructed separately. These cities include Chester, Connellsville, Easton, Erie, Harrisburg, Hazleton, Johnston, Lock Haven, McKeesport, Monongahela, Pittston, Titusville and Wilkes-Barre. Reading's big sewer mileage is due to the fact that it has a double sewerage system. Wilkes-Barre, with 131 miles, is second among the third class cities in the length of its sewers. Erie is third, with 118 miles; Altoona, fourth with 91 miles; Harrisburg fifth, 90 miles; New Castle, sixth, 89 miles. The cost of approximately 1,500 miles of sewers now existing in the third class cities of the state, has already gone far into the millions of dollars, the report of the bureau of municipalities shows. Reading's system is reported as being worth $2,408,373, while that maintained by Wilkes-Barre cost between $1,500,000 and $2,000,000. Sewer costs in Harrisburg have reached $1,750,000 and in Johnstown $1,167,324 has been expended for that purpose. The cost in Altoona, the report shows, has been $1,500,000. Four third class cities, the report sets forth, maintain sewage disposal plants. They are Altoona, Lebanon, Reading and York. The Altoona plant cost $215,141; the one in Lebanon, $75,000; that in Reading, $426,324; and the York plant $85,000.

## WATER SUPPLY

### Borough Not Allowed to Build Competing Water Works.

Kittaning, Pa.—The state public service commission has refused permission to the borough to build a water-works plant that would duplicate the works of the Armstrong Water Co. The commission holds that a duplicate plant would be an "economic loss" and would give "more or less inadequate service" until one or the other works was forced out of business. The commission also declares that the company has not "performed its duty" and should immediately improve its works.

### Water Rates Increased by Commission.

Richmond, Ind— Authority for a 7 per cent. increase in rates is contained in an order the state public service commission has issued in the case of the Richmond water works' appeal for more revenue. The increase is to be uniformly applied. Meter rate increase are to go into effect December 1 and flat rate increase April 1. Minimum charges remain unchanged· In previous order the commission authorized the company to establish rates to yield a return of 6½ per cent. on the $850,000 valuation of the plant, as estimated by the commission for rate-making purposes. The company in its recent case was able to show that it is not earning the rate permitted. The commission figured that a 7 per cent. uniform increase will yield the company the full 6½ per cent. The company asked the commission for authority to increase its common stock $25,000, which was alleged to have been put into betterments and additions. This would have established an $875,000 valuation instead of the $850,000 valuation, on which the rate of return is to be figured. The commission, however, did not find that the claim of the company is substantial and declined to grant permission for the additional stock issue.

## STREET LIGHTING AND POWER

### Determines City Payment for Distribution System.

Redding, Cal.—A decision of the state railroad commission fixing the compensation to be paid by the city for the distributing system of the Northern California Power Company in that city answers the company's criticism of the commission's method of determining the condition of the plant. Declaring that it sees no merit in the criticism, the commission says: "It is desirable that adequate allowance should be made by the commission in rates to take care of depreciation, and such allowance should be surrounded by safeguards which will make certain that they will be used by the utilities for the very purpose for which they are paid by the ratepayers. But, irrespective of whether the allowances are sufficient or insufficient and irrespective of whether they are used properly or improperly, the fact remains that in eminent-domain proceedings it must be the actual condition of the property at the time of valuation that is to be considered, regardless of the actual amount of the original investment, regardless of whether the owner has accumulated a depreciation reserve or not, and regardless of whether the reserve is built up by the sinking fund or straight-line method. The service condition of the plant as a whole is not entirely reflected by the condition per cent. The condition per cent merely reflects the condition of individual plant items as compared with new and takes no account of the general usefulness and efficiency of these working parts in their relation to the working capacity of the entire machine. If we consider the plant in the light of a machine constructed for the purpose of performing a definite service, it is clear that we cannot actually compute the service condition by a consideration alone of the probable life of the separate working parts. Many other considerations enter into such calculations. Besides the wisdom or unwisdom evidenced in the design or plan of the completed plant and the question of the adaptability of the various parts to the efficient and economical performance of the functions required of them, also a consideration of whether the plant has been overbuilt or underbuilt, there may be many factors other than those involved in the cost and the age of the separate parts which have a direct bearing upon operation of the plant, causing it either to be economical and efficient or wasteful and extravagant. It is to be admitted that a machine which is economical and efficient in operation has a greater value than one that is wasteful and extravagant. That this consideration cannot be included in a computation of the age and the cost of the parts composing the plant is evident."

### State Jurisdiction Over City Serving Outside Bounds.

Pasadena, Cal.—According to a decision by the State Railroad Commission, when this city, which operates a municipal electric light and power plant, went outside the territory defined as the city of Pasadena and sold electrical energy to the Raymond Hotel and other customers in the city of South Pasadena, it became, as other public utilities, subject to the jurisdiction of the commission. This opinion was handed down in the case of the Pacific Light & Power Corporation against the two Pasadenas. Accompanying the opinion is an order directing the city of Pasadena immediately to file with the commission its schedule of rates The case was presented to the commission through the medium of an agreed statement of facts, the question at issue being solely one of law. The Pacific Light & Power Corporation serves electrical energy in the city of South Pasadena. When its field was invaded by the municipally owned Pasadena plant it appealed to the commission, setting up the contention that in going beyond the limits of Pasadena the municipality had placed itself in the same category as privately owned utilities. The city responded with the claim that the use of the words "private corporation" in the state constitution in describing utilities precludes the Legislature from vesting in the railroad commission any jurisdiction with reference to utility operations of municipalities. Disposing of this claim by quoting from the state constitution and the public utilities act and Supreme Court decisions, the commission says:

> These decisions clearly hold that when a municipality engages in a public utility business, certainly in so far as extra territorial service is concerned, the municipality is to be regarded as acting in the capacity of a private corporation or individual and is subject to the same obligations and enjoys the same rights, in so far as its own public utility operations are concerned, as a private corporation or individual engaged in such a business.
>
> We believe the conclusion irresistible, therefore, that the city of Pasadena, in supplying a public utility service to the inhabitants of the city of South Pasadena, must be regarded as coming within the phrase "private corporation and individual or association of individuals" as that phrase is used in Section 23 of Article XII of the constitution, specifically defining certain public utilities to be subject to regulation by the Railroad Commission. It is our conclusion also that this service clearly comes within the definition contained in the public utilities act itself.

## GOVERNMENT AND FINANCE

### To Classify City Employes' Salaries.

Detroit, Mich.—Council has authorized the civil service commission to make a survey of all positions in city departments in order that a standardization of salaries and duties in various classes might be affected. An appropriation of $1,500 to cover the cost of clerical work in connection with the survey was also made. The suggestion that such a standardization be made came from city controller Steffens who pointed out the advantages of having employes in the same class under civil service but employed in different departments paid at the same rate. He said the work of estimating salary apropriations for the budget would be greatly simplified. Fred Smith, secretary of the commission declared himself in accord with the plan and announced that the commission would obtain the assistance of Harrington Place, a civil service expert connected with the Bureau of Municipal Research. According to Mr. Smith there exists at present a great diversity of salaries paid in different departments for the same class of work. In other departments the line drawn between different classes is so slight as to be negligible. This is especially true, he said, in the city engineer's office where there are several classes of draftsmen whose salaries differ but $20 a year. These classes should be combined according to Mr. Smith. "We have clerks in some departments receiving $1,000 a year while those in another department, doing exactly the same class of work are being paid $1500. This is unfair, both to the department and the civil service employe," Mr. Smith said, "for both positions are filled from the top of the eligible list. If it was required to fill the $1,000 position and then the $1,500 position later, the applicant standing highest on the list is given the lower paid position. All positions in the same class, regardless of department should be paid on the same basis." A careful study will be made of all the positions classified under the civil service commission, data being gathered from department heads and the employes under them, as to the duties and requirements of each position. From this data the commission will re-classify positions, standardizing each class as to salary and examination requirements. Weekly reports of the progress will be made to the council as, under the charter, all matters relating to salaries of city employes must be referred to that body.

### St. Louis City Bridge Taxed by Illinois.

St. Louis, Mo.—A suit brought by St. Clair County, Illinois, to compel the payment of taxes by the city of St. Louis, on the easterly half of the municipal bridge across the Mississippi River, has been decided in favor of the Illinois county. The county court held that taxation is proper because the bridge is intended to produce revenue by the lease of its railway deck. The east or Illinois half of the bridge has been valued at $600,000 by the assessors, and the 1918 taxes on this amount, which were involved in the case, are about $17,000. The bridge with its present approaches cost over $6,000,000.

## TRAFFIC AND TRANSPORTATION

### Variable Methods in Determining Railway Valuation.

Pittsburgh, Pa.—The value for rate-making purposes of the Pittsburgh Railways is $48,000,000, according to the opinion of the engineers who represented the city of Pittsburgh on the Pennsylvania Public Service Commission's joint valuation board, but a rate base to be just to both parties and unjust to neither should not be less than $65,000,000 and to give weight to the cost of reproduction should range between $65,000,000 and $70,000,000, in the judgment of the men on the board who represent the company. The report has been filed before members of the Public Service Commission in Pittsburgh. The valuation proceedings were begun eighteen months ago with the intention of establishing a definite calculable basis for the computation of an equitable rate of fare. The two engineers of the company on the board estimated that the traction system will need $18,986,000 for its operation during 1920, and that, to raise this sum, a fare of 8.45 cents is necessary. The two representatives of the city of Pittsburgh declare the railways will need only $17,446,000 for its operation in the coming year, but to secure this they must charge a 7-cent fare. The present fare is 7½ cents when paid by ticket and 10 cents in case of cash payment. The letter of transmittal to the Public Service Commission briefly summarizes the work of the board, and then goes on to relate the manner in which the valuations were arrived at. The value of the physical property was determined upon by seven different methods. They are as follows:

> Basis No. 1—Historical cost as determined upon from the records, with scrutiny of engineers and accountants, representing actual investment in physical property placed in the service of the public, $59,069,392.
>
> Basis No. 2—Estimated costs of reproduction new at prices ruling when each part of the existing property was constructed, and under original conditions of construction, $49,324,791.
>
> Basis No. 3A—Estimated cost of reproduction new at average prices of the period 1906 to 1915 inclusive, and under original conditions of construction, $56,148,398.
>
> Basis No. 3B—Estimated cost of reproduction new at prices indicated for 1918 by the trend of prices for twenty years pre-

vious to 1916, and under original conditions of construction, $60,892,200.

Basis No. 3C—Estimated cost of reproduction new at average prices in the period 1914-1918, inclusive, and under original conditions of construction, $73,560,300.

Basis No. 3D—Estimated cost of reproduction new at the estimated average prices for the period from 1918 to 1922, inclusive, and under the original conditions of construction, $84,191,300.

Basis No. 4—Estimated cost of reproduction new at prices and under the conditions ruling at the date of valuation, viz., April 1, 1918, $102,842,274.

No allowances were made by the board for franchise values in excess of cost, nor for earning capacity, nor for terminal facilities, nor for bridge rights in excess of cost, nor for the special value of the charter, which is one of seven said to be the broadest of the kind known. The company placed a substantial value on this charter, but the board denied it. It was on the question of whether "other elements of value," besides the actual physical valuation of the properties, should go into the total, that the valuation board split, the company's engineers opposing the stand taken by the city's representatives on "development values," "going concern values" and similar items. All the engineers agreed that the physical operation of the system required $14,086,000 next year. To the capital invested the city engineers would allow a return of $3,360,000, making the total requisite revenue $17,446,000. To capital the company engineers credited a return of $4,900,000 a year, thus making their total $18,986,000. The city's engineers recommended a zoning system of fares, presumably based on that recently projected for trial in Newark, N. J. The board also made a recommendation as follows:

> The solution of the railway problem, in our opinion, will not come with the mere setting down of fixed charges that are reasonable under all the circumstances on the amount invested. The real need, in our opinion, is for some contract arrangement between the public and the company, which would be based on the reasonable assurance of securing all necessary charges, including a return on the investment. We are absolutely convinced that a contract relationship should be established at the very earliest moment.

The report makes it plain that all its estimates were made without regard to the recent award of the National War Labor Board, which adds, according to the receiver's figures, $1,050,000 to the company's annual expenses.

### Fight for Five-Cent Fare and City Ownership.

Chicago, Ill— Public ownership of Chicago's surface lines within a period not to exceed three years, is a program which the city administration mapped out. It at once set the machinery in motion moving toward accomplishment of the plan. Corporation counsel Ettelson summarized the plan as follows:

1. Appointment by the mayor of a commission of engineers to study traction conditions and report to the mayor within six months.
2. Establishment of a peoples' transit district, similar in statutory requirements to the sanitary district, which would wield power independent of the city council and enable the issuance of bonds to purchase traction properties.
3. Demand for a special session of the state legislature to pass laws creating the governmental body to be known as the peoples' transit district.
4. After the above legislation is secured, the next step is the holding of a public election, at which the people will vote for candidates to be elected to a board of trustees of this peoples' transit district—as they vote now for trustees on the sanitary district board.
5. This board of trustees then to proceed to condemn traction properties under the right of eminent domain. Such lawsuits have the right of way in the courts.
6. The board of trustees to assume operation of the traction lines as the board of trustees operate the sanitary district system.

Mayor Thompson is appointing a commission of engineers. An appropriation of $250,000 has been placed at the disposal of the Mayor to get the engineers' work started. The "peoples' transit system," or Ettelson plan, attempts to reproduce the preliminary steps which finally led to the establishment of the sanitary district. It surmounts the bonding limitations of the city by seeking to create an independent taxing body which can issue bonds without regard to the city's limitations, just as the sanitary district does today. Meanwhile the public utilities commission has announced that the 7-cent fare would remain in effect until the state supreme court has given a decision on the legality of the commission's increased fare order. A petition has been filed in the Circuit court by corporation counsel Ettelson asking that the Chicago Surface lines be restrained from collecting 7 cents. The matter was put up to the public utilities commission with the receipt of an opinion from Attorney General Brundage, in which he ruled that the order of Aug. 4, fixing the fares at 7 cents, could not be modified by the commission, but that a new order, restoring the 5-cent fare, could be issued. The city bases its fight on a ruling made by Judge Smith of the Circuit court of Sangamon county, declaring the 7-cent fare illegal. The street car companies took an appeal and the case is pending in the Supreme court.

## LEGAL NOTES

### A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

**Limitation of Municipal Officers' Authority—Recognition by Contractors.**

(Pa.) Contractors, in dealing with municipalities, are bound to recognize the limitations upon the authority of the officers with whom they deal.—Union Paving Co. v. City of Philadelphia, 107 A. 370.

**City Improvements Affect Street Railroad—Liability.**

(N. Y. Sup.) Where improvements by city or below surface of street interfere with street railroad's track or structure, the railroad cannot charge the city with the expense of protecting its property or removing or relocating it.—City of New York v. Whitridge, 177 N. Y. S. 122.

**Ratification of Contracts by Electors—Modification.**

(Iowa) Where statute requires ratification of city's contract by vote of electors, city council cannot without such ratification modify contract entered into before enactment of such statute at a time when no ratification was necessary.—Ottumwa Ry. & Light Co. v. City of Ottumwa, 173 N. W. 270.

**Lien Creditors of Contractor—Recovery Against Surety.**

(N.Y.) Where the lien of creditors of a public contractor, under Lien Law, § 5, was simply against any unpaid balance on the contract, and not on the property, the village could not recover against the surety on the contractor's bond, having no personal interest in the unpaid claims, having paid none, and not being personally liable.—Village of Argyle v. Plunkett, 124 N. E. 1, 226 N. Y. 306.

**Pavement Guarantee—Disintegration of Concrete Base—Wearing of Top Surface.**

(Or.) In an action on an undertaking executed by a paving company and an accident and liability company insuring faithful performance of a pavement contract and providing for the repair of defects attributable to defective workmanship or material within five years, the mere fact that the top or wearing surface of the pavement wore out, leaving the concrete base to disintegrate, held not sufficient evidence to justify a finding of defective materials and workmanship.—Dalles City v. Ætna Accident & Liability Co., 182 P. 385.

**Police Power—City's Right to Remove Wooden Buildings in Fire Limits.**

(Cal. App.) City's police power cannot be bartered away by express contract.—Maguire v. Reardon, 183 p. 303.

Building Law, Ordinance of City and County of San Francisco, No. 4170, N. S., authorizing board of public works to demolish wooden building within fire limits upon owner's failure to so do within specified period after notice, is not discriminatory in providing for the general demolishing and removal of wooden building, and not referring to building of other inflammatory material.—Id.

Owner of wooden building constructed within fire limits of city in violation of San Francisco Ordinance No. 1198, passed pursuant to Charter of City and County of San Francisco, art. 2, c 2, § 1, subd. 5, cannot restrain city from demolishing building under Building Law, Ordinance 4170, N. S., regardless of validity of latter ordinance, since such building constitutes a nuisance, and equity will refuse any relief designed to perpetuate its maintenance.—Id.

Contracts made by owner of wooden building constructed within fire limits in violation of city and county of San Francisco ordinance No. 1198, with tenants, must be deemed to have been made with knowledge that the building was illegally maintained, and subject to right of city to remove it at any time.—Id.

City's power to remove wooden buildings erected within fire limits is an exercise of the police power, since it immediately concerns the safety of persons and property.—Id.

### Lien on Property for Improvement—Platted Land without Streets.

(Mo. App.) City's right to create lien on property of abutting owner for streets and sewer improvements is not founded upon any pre-existing right, but is in invitum and rests exclusively on a substantial adherence to the method prescribed by the ordinance authorizing it and charter as its basic power.—Boatmen's Bank v. Semple Place Realty Co., 213 S. W. 900.

Where land has been platted into lots and blocks, but streets have not been dedicated, it should be assessed for sewer improvements as one entire tract, and not as separate lots as laid out on plat.—Id.

### Levy of Special Improvement by City on County Property.

(Colo.) Under Const., art. 20, authorizing city to assume powers "of local concern," city which has by its charter assumed such powers has right to levy special improvement tax against county property situated within city; assessments for local improvements being of local concern."—Board of Com'rs of El Paso County v. City of Colorado Springs, 180 P. 301.

A city may levy special improvement taxes on county property within the city, and may enforce payment thereof.—Id.

### Municipal Dance Hall Regulation Valid.

(N. Y. Sup.) Municipal ordinance, requiring that dance halls be run by persons of good character, forbidding sale of liquor therein, regulating the age of attendants, forbidding Sunday dancing, and requiring a license, was valid.—Geyer v. Buck, 175 N. Y. S. 613.

### Extending Boundaries of Small Town—Police and Sanitary Regulations.

(La.) Though 50 per cent. of the area of a small, growing town is unimproved, it does not follow that there can exist no necessity for enlargement of its boundaries, and even though no such necessity exists, such enlargement may be both advisable and reasonable.—Bowman-Hicks Lumber Co. v. Town of Oakdale, 81 So. 367.

Where a small, growing town is surrounded by mills of lumber companies, including the quarters of their employes, touching its boundaries, and people of town and officers and employes of companies live in such juxtaposition as to form a single community, it is reasonable that they should be subject to same police and sanitary regulations, and hence reasonable to extent boundaries of the town to include such mills and employes quarters.—Id.

### Provision of Building Code—Injuring Adjoining Building by Excavation.

(Wis.) Provision of Building Code, § 43, that "no one shall excavate so as to injure any adjoining building," is a change in what would otherwise be the respective rights and liabilities of plaintiff and defendant, adjoining lot owners, and their rights must be determined without regard to the ordinance; there being no express declaration of the Legislature taking away or changing established property rights of adjoining landowners by statute, or delegation of power to common council, under Milwaukee City Charter, c. 4, § 3.—Hickman v. Wellauer, 171 N. W. 635.

Ordinances must not be inconsistent with the general laws of the state.—Id.

### Pavement in Disrepair—Replacement by Contractor.

(N.Y-Sup.) Sewer contractor, under contract to replace pavement, is required, in restoring pavement, to put it in good condition, though at time he began work it was in a state of disrepair.—John J. Creem Co. v. City of New York, 177 N. Y. S. 229.

### Lien on Money Due Contractor from City.

(Cal. App.) Owner of steam shovel who rents shovel to contractor constructing roadway for city is not entitled to equitable lien upon money due contractor by city for rent due owner from contractor upon giving city written notice that such rent has not been paid, under Code Civ. Proc., § 1184, not having "performed labor or furnished materials" used in construction within such statute.—City of Los Angeles v. Kautz, 179 P. 716.

### Powers of Municipality.

(Ala.) A municipal corporation may exercise only the powers granted in express terms, those necessarily applied in or incident to the powers expressly inferred, and those indispensably necessary to the accomplishment of the declared objects and purposes of the municipality.—Stokes v. City of Montgomery, 82 So 663.

### Ordinance Requiring Sanitary Privy Unreasonable and Invalid.

(Fla.) If a municipal ordinance directly affecting the rights of individuals is arbitrary and unreasonable, it is invalid, and will not be enforced.—Cary v. Ellis, 82 So. 781.

An ordinance requiring a sanitary privy to be constructed and maintained in every house and building in the city in which people live, or where they congregate or assemble, or any kind of business is carried on, is unreasonable and arbitrary, and invalid.—Id.

### Continuing Right to Change Charter.

(Mo.) Cities have a continuing right to make and change their charters.—Collins v. A. Jaicks Co., 214 S. W. 391.

### Street Resurfacing Paving, Not Maintenance.

(Mo.) In a petition to have special tax bills declared invalid, allegations that work had consisted of "putting a top dressing on said boulevard" means resurfacing, which is a paving or repaving, and not merely maintenance.—Collins v. A. Jaicks Co., 214 S. W. 391.

### Sovereign Powers of City—Damage Caused by Fire Department—Liability.

(Ind. App.) A municipal corporation is a government possessing, to a limited extent, sovereign powers, which may be denominated governmental or public; and, such powers being public and sovereign in their nature, such municipal corporation is not liable for a failure to exercse them or for errors committed in their exercise.—Louisvlle & Southern Indiana Traction Co. v. Jennings, 123 N. E. 835.

In extinguishment of fires and in making arrangements therefor, the municipality acts in its governmental capacity and is not liable for damages caused by the negligence of its fire department.—Id.

### Restriction on Business—Regulation of Public Filling Stations.

(Ohio.) Penal ordinances, or those restraining exercise of any trade, occupation, or business, or restricting the use, management, or alienation of private property, will be strictly construed, and not extended to include limitations not therein clearly prescribed, and exemptions from such restrictive provisions are also liberally construed.—State v. Dauben, 124 N. E. 232.

Under ordinance forbidding the location, building, or operation of a public filling station in a residence district wthout written consent of two-thirds of owners within a specified distance therefrom, but exempting the owner or operator of any such station previously erected, he need not procure such consent before repairing or rebuilding such station.—Id.

# NEWS OF THE SOCIETIES

**Dec. 2-5.** AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Annual meeting. New York City. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

**Feb. 9-13, 1920.**—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention, Louisville, Ky. Secretary, E. L. Powers, 150 Nassau Street, New York.

**May 18-21, 1920.**—NATIONAL ELECTRIC LIGHT ASSOCIATION. Annual convention, Pasadena, Cal. Acting secretary, S. A. Sewall, 29 West 39th St., New York City.

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### National Municipal League.

Announcement has been made of the program of the National Municipal League for the Moot Constitutional Convention which will be a feature of the League's twenty-fifth annual meeting, to be held in Cleveland, December 29, 30 and 31. The purpose of the convention is to consider what form and provisions of a state constitution are best suited to present-day needs of state, county and municipal government, a question of immediate interest because of the general movement in many states for a revision of state constitutions that are regarded as outworn and inadequate. Illinois and Nebraska have recently elected delegates to constitutional revision conventions, Pennsylvania and Vermont have newly appointed commissions to consider the need of new constitutions, and other states are preparing to fall into line.

"Every once in a while the ordinary layman, who has approved of the passage of some desirable law or the institution of some much-needed political reform, is jolted by the news that it has been declared unconstitutional by the courts. It requires a concrete demonstration of this kind to bring home to the average citizen the fact that some constitutional provisions and restrictions imposed twenty-five or fifty years ago are badly out of touch with changed conditions; but students of political science have long realized that many desirable improvements in our laws are hampered or altogether prevented by antiquated constitutional requirements. Many sources of waste of public funds and many inequalities in political and social conditions are perpetuated by this means.

"The National Municipal League, for twenty-five years a leader in devising and testing improvements in government and administratiive methods, has adopted the moot convention method of crystallizing the sentiment for constitutional improvement and of organizing the work of specialists in this direction. The plan has attracted nation-wide attention, and representatives of many organizations interested in problems of a civic or governmental nature, including the National Short Ballot Organization, the Proportional Representation League, the American Judicature Society, the National Civil Service Reform League, the Honest Ballot Association, the Political Science Association, the National Voters' League, the National Budget Committee, the Institute of Government Research, the War Camp Community Service, and many governmental research bureaus, are arranging to be present to observe the proceedings of the National Municipal League's moot convention and participate in the discussions. It is also proable that many of the delegates to the constitutional conventions of Illinois and Nebraska will attend.

"The scope of a state constitution covers every field of state, county and municipal government, so that the moot constitutional convention of the National Municipal League will have a wide range of subjects to consider. These include not only such technical matters as budgets, civil service, debt limitations, and limitations on legislation, but also the whole gamut of vexing problems that involve the constantly rising cost of living; the triangular relation of capital, labor and the consumer: and the proper status and control of public utilities. Information has already come to the headquarters of the National Municipal League that many authorities in economic and political science, including Prof. Albert Bushnell Hart and Prof. A. N. Holcombe of Harvard University, Dr. Charles A. Beard of the New York Bureau of Municipal Research, and H. W. Dodds of the Western Reserve University, are preparing constitutional proposals to be offered at the moot convention."

### International Power Economy Conference.

A meeting of the Executive Committee of the International Power Economy Conference was held recently having been called by chairman C. A. Tupper for the purpose of formulating a plan of permanent organization.

It was the general opinion that the first work should embrace the formulation and printing of a statement of the objects sought, which should also give a tentative constitution, clearly point out the aims of the Conference, the general ideas of procedure to reach the goal aimed at and explain the organization necessary to accomplish the desired result.

A campaign should then be started to secure not less than 100 contributing members and more, if possible, to finance the greater work which must follow if success is to be achieved.

The executive secretary was directed to proceed immediately with this work as the situation with regard to fuel is already bad with absolutely no indications that conditions are likely to improve, at least in the near future.. The Conference now has the service of Col. F. G. Bolles, late of the War Department Claims Board, Washington, D. C., as executive secretary. Colonel Bolles is well qualified for this work. His past experience in the national field of power development with such concerns as Westinghouse Electric & Manufacturing Co., Bullock Electric Manufacturing Co., Allis-Chalmers Co. and the Bucyrus Co., gives him a firm grasp of the problem and its importance as a national conservation. His knowledge of foreign economic conditions was gained through six years' travel in fourteen European countries.

### The American Association of Engineers.

The American Association of Engineers announces that effective with the January number its official publication, The Monad, will be published under the name of "Professional Engineer." At the same time the change in name is made the publication will be increased to a 9 x 12 page. The magazine will remain a monthly.

Following a favorable vote on the part of the members of the Idaho Society of Engineers for affiliation with the American Association of Engineers the executive committee of the society has resolved to amalgamate with the American Association of Engineers under the title of the "Idaho Society of Engineers' Chapter of the American Association of Engineers."

### Electric Vehicle Section, National Electric Light Association.

A meeting of the executive committee of the Electric Vehicle Section of the National Electric Light Association was held recently at the New York headquarters. Chairman George B. Foster presided.

E. R. Whitney, who accepted appointment as chairman of the standardization committee, announced that the Society of Automotive Engineers had suggested the formation of an electric transportation division of its standards committee, of which E. P. Chalfant had been suggested as chairman. The division would be divided into the following sections: Electric commercial vehicles, electric passenger cars, electric industrial trucks and tractors, electric storage batteries and electric wheel chairs, with the possibility of an accessories section. The chairman of these sections, together with the chairman of the division, constituting the executive committee of the division, would report to the main standards committee of the Society of Automotive Engineers.

It was the consensus of opinion that much valuable work could be undertaken by the federal and municipal transportation committee this year, notably immediate co-operation with the New York-New Jersey Port and Harbor Development Commission, for

(*Continued on page 336*)

# NEW APPLIANCES

**Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.**

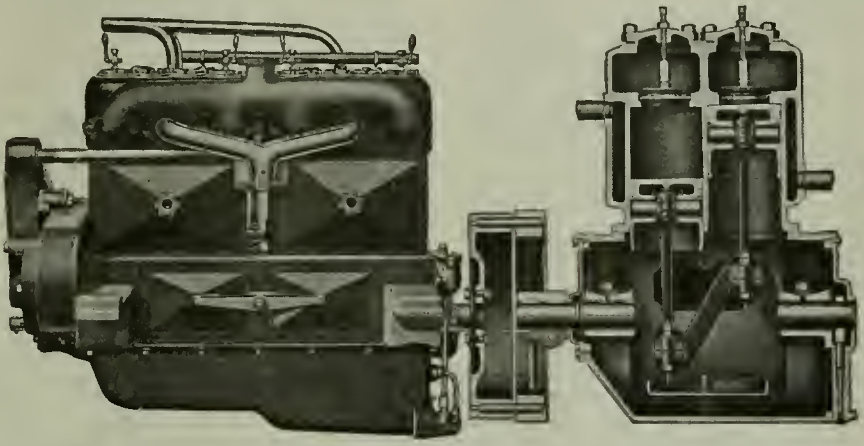
## PORTABLE AIR COMPRESSOR.

### New Ingersoll-Rand Light Gasoline-Driven Equipment.

Portable air compressors have popularized all sorts of pneumatic labor saving devices for the contractor and eliminated the trouble and expense of installing an air power plant on his short-time job. "Portable" however, has sometimes been a misnomer, meaning merely "mounted on wheels." Portable outfits of many varieties have been developed in the past few years, each successive design bettering the one which preceded it and now Ingersoll-Rand Company has recently introduced a light weight gasoline engine driven unit, built in two sizes, to be known as the "Imperial Type 14 Portable Compressor."

These are all-steel outfits, from their sheet steel canopy to the broad tired steel wheels. The power plant of each consists of a duplex, vertical compressor driven at high speed by a four cylinder, four cycle, tractor type gasoline motor. The outfit, being designed especially for portable use, has had unnecessary weight eliminated, and is designed to afford maximum air power output per unit weight. The larger machines, of 210 cu. ft. capacity weighs only 6000 lbs. and the 118 cu. ft. unit 4000 lbs. The gasoline motor drive provides power in economical form and in a mechanism that can be confidently entrusted to the average operator, for men familiar with gasoline engines are everywhere available and make thoroughly competent engineers for the work in which they are used.

The compressors have cylinders cast en-bloc, with cylinder heads, valve chambers and water jackets integral. Both intake and discharge valves are of plate type and are located directly over the cylinder bore. Crank shafts and connecting rods are drop forgings. Air pistons are fitted with three piece piston rings and, in addition, with an oil wiper ring. This latter returns all surplus oil from the cylinder walls to the crank case, and is claimed to obviate the difficulty caused by having the air carry an excess of oil into the receiver.



SECTIONAL POWER PLANT, INGERSOLL-RAND AIR COMPRESSOR (118 cu. ft. capacity)

All bearings are die castings of anti-friction metal. Hand holes in the crank case permit convenient access for adjusting main bearings and those of the crank pins. All parts are lubricated by splash from an oil reservoir in the crank case.

The compressors are provided with inlet unloading devices which automatically close the compressor intake when the receiver pressure rises above a predetermined limit, and permit the machine to again take up its load when the pressure has fallen a definite amount.

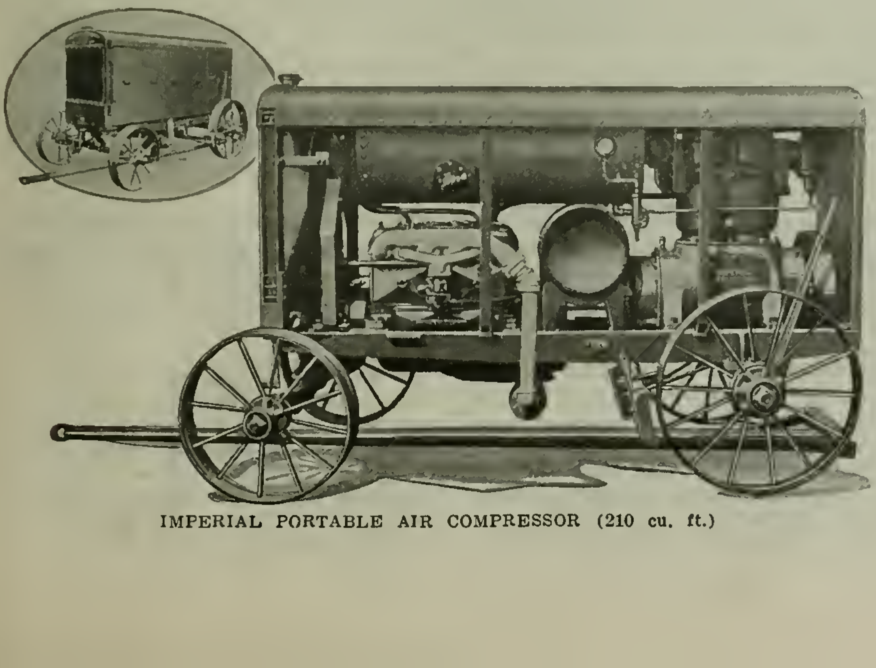
The gasoline driving motors are of long stroke type, and operate at medium speed. They are equipped with high tension magneto ignition with automatic governors to maintain constant speed under all working conditions and to prevent overspeeding when idling. A splash oiling system lubricates all moving parts. Starting crank is located at the front of the machine beneath the radiator.

Both compressor and driving motor are water cooled by a circulating system, with centrifugal pump, large radiator and powerful blast fan. The radiators are made up of removable sections, a construction which allows the removal and repair of a damaged section without taking down the entire radiator or interrupting the use of the compressor.

Each of these units is equipped complete with receiver, safety valve, drain valves, pressure gauge and service valves to which the air hose lines may be attached. When fuel tank has been filled, lubricating oil provided and the cooling system supplied with water, the units are ready for work.

The mounting of the machine is of interest, particularly the swiveled front axle which moves freely in both horinzontal and vertical planes. This, with the rigidly attached rear axle, gives three point suspension, and permits the outfit to pass over inequalities of the ground without any racking effect or misalignment of the power plant.

The two sizes 118 and 210 cu. ft. capacities, differ in respect to the location of the air receiver and in minor details of design. The power-compressor unit and the whole outfit are shown in the accompanying illustrations. These compressors are made by the Ingersoll-Rand Company.



IMPERIAL PORTABLE AIR COMPRESSOR (210 cu. ft.)

# INDUSTRIAL NEWS

### Asphalt Association Headquarters in Washington.

Washington has been selected as a district headquarters by **The Asphalt Association,** whose main office is in New York. At the nation's capital, as most of the large industries now realize, decisions of great moment are constantly being made by federal departments and bureaus. It is estimated that this year more than forty million square yards of asphalt will be laid in the United States.

Major Harry D. Williar, an engineer officer in the First Division overseas, will have charge of the Washington office of the Asphalt Association, in the Munsey Building. Major Williar is a Marylander, receiving his training as an engineer on the State Road Commission and later with the paving commission of Baltimore. Included in the Washington District are the states of Maryland, Pennsylvania, Delaware, Virginia and West Virginia.

### International Exposition of Municipal Equipment Discontinued.

The project for an International Exposition of Municipal Equipment which was to be opened recently at the Grand Central Palace, New York City, under the direction of the Merchants and Manufacturers Exchange, has been abandoned. It is expected that some of the prospective exhibitors will show their equipment in the machinery exhibition in which they will probably attract wider attention from more varied groups of visitors.

### Sinclair Refining Company to Produce Asphalts.

**The Sinclair Refining Company,** 111 West Washington st., Chicago, Ill., announces the formation of an asphalt sales department to handle the output of the Meraux, Louisiana, refinery, formerly owned and operated by the Freeport & Mexican Fuel Oil Corporation. The plant will be devoted exclusively to the production of refined asphalt from specially selected heavy maltha from the Panuco Field in Mexico.

It is the intention of the company to produce a complete line of high grade asphalts for all purposes. By reason of controlling, through its affiliated companies, its own producing properties in Mexico and ample steamship facilities to transport the raw material to the refinery at Meraux, the company is ideally situated to become an important factor in the asphalt business in this country.

A large number of tank cars specially equiped for handling asphalt is already in service, and the equipment is being steadily increased.

The headquarters of the new department will be located in the Conway Building, Chicago, and E. F. Fitzpatrick has been appointed manager and J. M. Woodruff, assistant manager.

Mr. Fitzpatrick has had a wide experience in the general asphalt and petroleum business, both in this country and in the Republic of Mexico. He has been identified with the Sinclair Refining Company for the past year and a half, having joined the organization originally as manager of the refinery sales department and for the past several months has been assistant sales manager of the general oil section of the business.

Mr. Woodruff was formerly manager of the paving and publicity departments of the Standard Asphalt and Refining Company. He has been identified with the marketing and use of asphalt in pavement construction in the central and southern states for the past ten years. He assisted in organizing the Southern Asphalt Association of Atlanta, Georgia. He resigned as general manager of that association to accept the position with the Sinclair Refining Company.

### War Department to Sell Electric Generator Sets.

The Director of Sales announces that the Surplus Property Division, Office of the Quartermaster General of the Army, is offering for sale 400 gasoline driven, electric generator sets, with switchboards and gasoline tanks, which have been declared surplus by the War Department and on which offers will be received at any time by the Surplus Property Division, Munitions Building, Washington, D. C.

The generator is a 25 kilowatt, direct current commutation pole type. Either 115 volt, two wire, or 230 volt, three wire, generators can be supplied. The engine is of the closed, four cycle, single acting, vertical type, with four cylinders and is capable of operating the generator at full load indefinitely, and at a 25 per cent overload for two hours. The sets are high grade in every respect and combine a number of improved safety and gasoline saving features.

These machines are designed for close regulation which makes them very desirable for small electric light and power plants, such as are required by stores, apartment houses, hotels, small factories and even small towns. Owing to the present coal shortage and the curtailment of electric current in many cities and towns throughout the country, these gasoline driven generators should prove particularly useful as auxiliary or emergency lighting and power equipments.

The sets which the government is offering for sale, are new and have been carefully stored since they were purchased by the government about a year ago. They are packed in the crates in which they were shipped from the factory. They are located at Schenectady, N. Y., and New Cumberland, Pa., and will be shipped promptly upon approval of submitted offers.

Inspection of the machines, switchboards and tanks may be made at the points of storage or complete specifications may be obtained from the Surplus Property Division, Munitions Building, Washington, D. C. Information relative to the terms of sale, storage points, etc., may be obtained from the same office.

### "Malleable Castings" Manufacturers Organize to Improve Product.

Considerable interest is being directed at the **American Malleable Castings Association,** which represents the many district organizations in the malleable castings industry. Under great difficulties the members are determined to establish a standard of quality. This unusual action by a group of competitors, the strong assisting the weak, has for its object the improvement of the quality of the industries products and results now announced prove the success of their endeavors.

Aside from the various laboratories of its members the association maintained at Albany a Research Department for investigation and experiment, and for the testing and analysis of the daily output of each member of the association. Impartial tests were made and the results, together with direction for improvement, where the need was indicated, were forwarded to the respective members.

So successful has the work of the association proved that today it is credited with bringing all its members to a high average quality in their product, known as "malleable castings." Having accomplished that result, the association it is said will continue these daily tests and analyses for the purpose of grading the product of each member. When a member's product has daily met the requirements of the prescribed standard for a period of three months a "certificate of quality" will be issued to that member, who may designate his output as "Certified" malleable castings. These certificates will be renewed quarterly where the quality required is maintained.

The association is issuing a booklet on Malleable Iron and its production which should prove very interesting to those who desire a better understanding of the methods employed in the improvement of that product. The book can be obtained without charge by writing to the American Malleable Castings Association, 1900 Euclid Building, Cleveland, O.

# NEWS OF THE SOCIETIES

*(Continued from page 334)*

which B. F. Cresson is consulting engineer.

F. M. Feiker, chairman transportation engineering committee, stated that the committee had developed a national list of users of electric trucks, which, though not complete, at least included the most representative users. Questionnaires are being sent in an effort to ascertain operating cost data, etc.

# Municipal Journal & Public Works.

City County State

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## OUR MONTHLY INDEX OF PERIODICALS.

Each month, in the second issue of the month, we publish an index of articles dealing with municipal and public works matters which have appeared in other periodicals. Although we believe that we keep our readers pretty well informed on the most important of such matters, we want to help them to read all that is printed on any subject that they are especially interested in; and many of them find these monthly indexes of great service for this purpose.

Others, however, do not realize how many good things there are in "Municipal Journal & Public Works." If you have overlooked these monthly indexes, let us call your attention to them. The November periodicals are indexed in this issue. You will find them on the right-hand pages alternating with the pages devoted to Contract News immediately before the advertising pages.

## MAINTAINING SEWERS WITHOUT FLUSHING.

It has been and is, we believe, the opinion of most sewerage engineers, including the writer, that, in order to prevent deposits and the accompanying odors in dead-end sewers or those forming the furthest extremities of laterals, it is necessary to flush these at intervals, preferably of not more than a day or two. And yet instances have been reported where such dead-ends have operated for years without any flushing and without any objectionable features apparent thereform. One such is referred to in this issue, the borough of Millville having used dead-ends laid on grades of one per cent or more, in connection with which not only were there no regular appliances for flushing, but the houses connected with the sewers had no public water supply for the first four years and therefore probably did not discharge so large an amount of water as would houses in a city furnished with such supply. The system has now been operating for twenty years, and is reported to have never given any trouble.

Possibly considerable importance should be attached, however, to the fact that the upper end of each sewer was connected to the roof-water leader from the nearest building, by which the run-off from the roof served to flush the sewer during each rain storm. It is interesting to note that a similar expedient for flushing sewers was adopted in the construction of the industrial housing project of Loveland Farms near Youngstown, Ohio (to be described next week).

It would seem very probable that this use of roof-water would be much preferable to no flushing whatever; but there remain the objections that the flushings take place only when rains occur and consequently are under no possible control of the municipal authorities, and further that the fact that some houses are permitted to connect roof-water leaders to the house sewers may lead amiable officials to extend the privilege to others until so many houses are so connected that the capacity of the sewer is far overtaxed in time of rain storms, with disastrous results. In spite of these exceptions, therefore, the writer would much prefer provisions for flushing all dead-ends by which the times and rates of flushing would be under the control of those whose duties it is to maintain the sewers.

## AGGREGATE SHORTAGE IN 1920.

The production of sand, gravel and crushed stone must be nearly doubled to carry out the construction program of 1920. This is the statement of the National Association of Sand and Gravel Producers, supported by certain figures and calculations. These, in general, are that in 1916, when there was the largest production of mineral aggregates in this country ever reported—140 million tons—$136,000,000 was spent for surfacing roads, exclusive of municipal paving, for which it is estimated that forty million tons of aggregate were used, leaving one hundred million for all other purposes. There is available for high way work in 1920, $633,000,000, which, at $20,000 a mile, would build 31,650 miles of road, requiring 125 million tons of aggregates. This does not include maintenance of highways or street paving. It is also estimated that the demand for stone for buildings, railroads, etc., will be 50 per cent greater than in 1916, giving 150 million tons. This gives 275 million tons of aggregates needed for next year's work.

The effort of the Bureau of Public Roads to secure action tending to facilitate the production and distribution of aggregates, and actions taken by state highway departments toward the same end, have already been reported in these columns.

## CASHING IN ON LEISURE TIME.

Whether a man makes a success or failure of life depends largely on how he spends his leisure hours.

Entering a contractor's office the other day, a representative of this paper found him sitting at a table well covered with copies of "Municipal Journal & Public Works" and other technical papers, most of which were still in their wrappers. He explained that, now that the outdoor work was over for the season, he was catching up in his reading and trying to get some pointers for next year's work.

We suspect that there are a great many of both contractors and engineers, who, although too busy to keep up with the art and science of their business or profession during the construction season, are too lazy or indifferent to do so when winter gives enforced leisure. The next three months, in the northern part of the country at least, will not offer much opportunity for outdoor work, but there is every evidence that it will come earlier in 1920 and with a bigger rush than ever before, in highway construction at least. Consequently, preparation in the way of learning more effective or economical methods, or selecting new equipment, or in any way preparing either knowledge or plant for next season's work, must be done during these next three months. And twelve weeks is a mighty short time to do it in.

The engineer who fails to keep up to the minute in the scientific discoveries and the improvements in the art of his profession, or the contractor who fails to learn of the methods and appliances by which some of his competitors hope to do work cheaper next year than last, is losing a most important opportunity.

These things cannot be found in text books—they are too new. Some can be picked up by conversation and visiting around among fellow engineers and contractors; but the richest mine of information will be found in the technical papers, and the wise contractor or engineer who has been too busy to keep up with his reading during the working season will utilize the opportunity offered by the next few weeks to catch up with the procession of those whose "knowing how" will make them next year's successful ones. For methods and materials he will read the descriptive articles; for new equipment he will study the "New Appliances" department; and he will read the advertisements from cover to cover. And it is dollars to doughnuts that in some of these he will find a solution to problems that have troubled him or that he is going to run up against next season.

## WISCONSIN CEMENT CONTRACTS.

The state highway engineer of Wisconsin, A. R. Hirst, is among those who are making early preparation for next season's work, especially in the matter of obtaining materials well in advance of the opening of construction. Bids were called for December 15th for about 470,000 barrels of Portland cement to be delivered next year for use on Wisconsin federal aid projects for road, bridge and culvert construction. The general conditions state that it is the aim of the commission to store as much cement as possible during the first four months of 1920, and they estimate that they will be able to receive about 25 per cent of the total amount before the first of May.

In addition to this early asking for contracts, the specifications contain several provisions worthy of notice. The cement is required for nearly one hundred projects, and the approximate amount required for each is stated, but the contractor "will not be required to furnish more than 10 per cent over the estimate named for each destination."

"In the event of an increase or decrease in transportation charges on cement furnished on this proposal, from point of shipment to place of delivery, the amount of such increase or decrease shall be added to or deducted from the price paid to the bidder, on all cement shipped by it during the period in which such changed transportation charges are in effect."

Bids are asked for cement in cloth sacks, in paper bags, and in bulk, 376 pounds being considered equivalent to one barrel in the last case; the commission having the option of specifying in which of these three ways the cement shall be shippd. The bid is to include 15 cents a sack for cloth sacks, which amount will be returned to the commission in exchange for empty sacks. The price of paper bags will be included in the bids for the cement. "Shipments in paper bags are made at commission's risk of breakage and resultant loss of cement."

The successful bidder must give a bond in a sum not less than 100 per cent of the estimated amount of his contract.

Payments for cement will be made within thirty days from the date of invoice covering each shipment. If they are made three times a month averaging within ten days from date of invoice, a discount of 5 cents per barrel is to be allowed.

The commission agrees to accept or reject proposals within ten days after the bids are opened.

# Asphalt Paving in a Small City

By W. A. Hardenburgh

A contractor in North Carolina is using pneumatic tires on his trucks. At a central oil-burning concrete mixing plant he unloads five cars of stone and sand a day directly into bins by means of an unloader; from the bins it falls into measuring boxes, from them into the mixer, and from the mixer into the trucks—all by gravity. Other details also are described.

Of interest to every contractor and municipal official are the various devices, plans and machines that may be adopted or used to overcome the high cost and inefficiency, not to mention the scarcity, of labor. Workmen may not really be difficult to get in quantity, but to secure labor in quality is the problem of the contractor's life. Some of the devices being used in the laying of a large amount of sheet asphalt in a small North Carolina city, Fayetteville, may be of interest, for they represent practices in a section of the country which the past few years have enriched materially and which now is attempting to make up for the past lean years of municipal improvements. Indeed, throughout the Southeast generally, money for new construction is plentiful and construction work waits only on the ability to get equipment and labor.

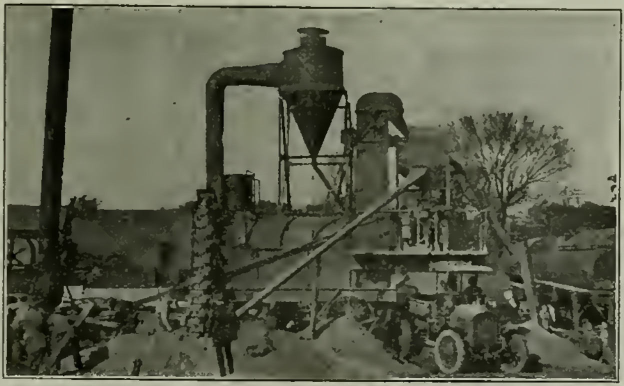
The job in question included principally the laying of about 50,000 square yards of asphalt pavement on a concrete base. There was, in addition, considerable resurfacing work and patching, curbing, etc. The streets that are being paved are mainly old water-bound or penetration macadam, and require only shallow grading, concrete base and asphalt surfacing. The concrete base is of 1:3:6 mixture, and there is one and one-half inches each of binder and wearing courses.

Usual practice is followed in the patching work. Hot asphalt is hauled from the plant by 2-ton motor trucks, as needed. In the resurfacing, the old surface is first swept clean and then spread with a mixture of asphaltic cement and naphtha, the proportions being about half and half. Wearing surface is then applied and rolled.

Very few men are required for the excavating and grading work. A No. 6 Keystone grader, equipped with a half-yard scoop, is used to bring the street to rough grade and section. The average excavation is in the neighborhood of 8 inches. The usual amount of excavation per day is from 150 to 180 cubic yards. This is hauled by teams and trucks, and is being used by the city for surfacing other streets. This old macadam material is un-

At the right is shown the oil-burning asphalt plant used on this contract, having a capacity of about 800 square yards of pavement a day. It is located near the center of the city.

Below is the grader used for rough-grading the streets an average depth of about eight inches. It is removing 150 to 180 cubic yards a day.



Below is shown the type of truck used for hauling both asphalt and concrete. The unusual feature of these is the use of pneumatic tires—40x8 rear and 37x5 front. In the light, sandy soil of this section, these tires compact the sub-grade instead of cutting into it. Also the contractor finds the truck wear and breakage less and the speed greater than with solid tires.

usually good in quality and is mixed with just enough clay and dirt to compact readily, forming a good and cheap surface.

### THE MOTOR TRUCKS.

At present the contractor has but four motor trucks, though six more have been ordered. Of the four now in use, two are engaged in hauling "hot stuff," while the other two are used in connection with grading work.

These trucks are rather peculiar, or rather the contractor has ideas about trucks that differ from those usually held. His trucks are 2-ton "Superior" machines, equipped with hand dumps in preference to power dumps, and with pneumatic tires. The rear tires are 40 x 8 inches and the front 37 x 5 inches. Although both first cost and tire-mileage cost may be greater, the contractor contends that this is more than overcome by the less wear and breakage on the trucks and, to some extent, by the better speed the trucks are able to maintain continuously.

The roads in this section are either sandy or of a light clay that will not withstand heavy wheel loads, and there is no doubt that trucks with pneumatic tires can be handled easily on soft subgrades. Unlike the knife-shaped solid tires in general use, which seem designed to cut into the ground under a load, the pneumatics left scarcely more than the mark of their tread on the subgrade.

The number of teams used to aid the two trucks in hauling away excavated material varies. The length of haul changes almost daily as the point of delivery of the excavated material is shifted from one street to another.

### PREPARING SUB-GRADE.

Following the grader are two men with a team and a dump scraper. This outfit cleans up along the street curbs and brings the street as near as possible to the final grade and section. The material excavated by them is piled in large heaps at such intervals along the street that the scraper does not have to exceed the economical haul. These heaps are later removed by steam shovels. As the street to be paved is already curbed and practically graded, all material has to be hauled away.

Following the rough-graders, grade stakes are set and a final grading gang of five men bring the street to the final grade and section. The waste piles formed by the rough grading gang are used for either borrow or storage piles.

### MIXING CONCRETE.

No concrete base has yet been laid, but the absence of water at the far end of the street, and the cost and difficulty of piping or bringing it by hose or other means, decided the contractor to attempt to lay the concrete base from a central concrete mixing plant. For mixing the concrete, whether the work be done from a central plant or in the usual fashion, a Koehring 18-E bucket-and-boom mixer will be used.

Both sand and stone are shipped in, and the cars are unloaded by means of a Jeffrey unloader working from a pit under the track. With this equipment, about five cars a day (about 200 tons) can be unloaded. It is planned to rig bins for sand and stone, and place underneath these a box with compartments for the proper amount of the aggregates. The unloader will work directly into the bins, from which the sand and stone will pass into the measuring box, and be dumped into the scoop of the mixer. By this means one handling of the aggregate will be eliminated, with its consequent waste and cost, and the number of men necessary at the mixing plant will be materially decreased.

Motor trucks will be used for hauling the wet concrete from the plant to the job. It is planned to so mount the mixer that, by means of the bucket and boom, the concrete can be dumped directly into the trucks. No serious settling of the aggregate is thought likely, especially with the rather short haul and the use of the pneumatic tires. Also, the trucks are constructed so that the body is raised to a steep angle for dumping, and this will facilitate handling the wet concrete.

### ASPHALT SURFACE.

The asphalt mixing plant is located nearly in the center of the city, and about a mile or more from the probable location of the concrete mixing plant. An oil-burning "Iroquois" plant, manufactured by the Barber Asphalt Paving Co. is used. The nominal capacity of the plant is about 800 square yards per day, but to date it has been used entirely on patching and resurfacing jobs.

To provide storage space at the mixing plant, the contractor has constructed two concrete tanks, one for fuel oil and the other for asphalt. These are placed close to the mixer and are covered over to protect from fire or from impurities. They provide ample storage space, and at the same time protect against delays in delivery.

The binder course is mixed in batches of about 600 lbs. The percentage of asphalt on this runs, with the varying conditions of patching and resurfacing, from about 10 to 11.8 per cent. The average composition of the filler is: 200-mesh, 1.2%; 80-mesh, 19.1%; 40-mesh, 30.1%; 10-mesh, 29.4%; quarter-inch, 4.6%; half-inch 5.5%; three-quarter-inch 7.5%; 1-inch, 2.6%. With the wearing course, the mixture averages 71 pounds of asphalt, 88 pounds of filler and 441 pounds of sand. The screen results are as follows: 200-mesh, 1.5%; 80-mesh, 24.2%; 40-mesh, 37.4%; 10-mesh, 36.9%.

On the work so far done, but two trucks have been necessary for hauling the hot stuff. Trucks equipped with pneumatic tires seem especially suited for work of this sort, as better time can be made in traveling to and from the plant. Additional trucks will be employed when surfacing work is started on the main job.

For the grading, laying of a 5-inch concrete base mixed 1:3:6, and the construction of an asphalt pavement three inches thick, the price paid is $3.18 per square yard. The work is being done by the American Contracting Co., of Moultrie, Ga., under the direction and supervision of E. C. Derby, city engineer of Fayetteville.

## A Practical Blue-Print Protector.

Blue-prints are always getting dirty, wet, greasy or torn while being handled by workmen using them.

An inventive genius has designed a very practical blue-print protector of simple construction and low cost.

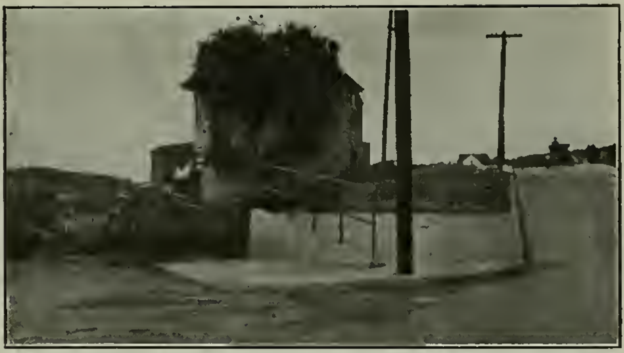
A sheet of transparent sheeting—the same material used for lights in auto curtains—is cut to desired size. A piece of light-weight leather substitute is then cut about a half inch larger all around than the piece of sheeting. This extra half inch allows for a lap-over on all but the top side of the protector. A sewing machine stitches the lap down to the sheeting forming a large flat pocket, open at the top for the insertion of the blue prints.

Both the transparent front and the coated fabric back are water-proof and grease-proof. Dirt or grease may easily be wiped or washed off, either without injury to the material. Both materials are flexible and the holder may be rolled up if desired in the same way an unprotected blue-print is usually handled by a workman.

## A DIFFICULT SIDEWALK INTERSECTION.

The most difficult condition ordinarily encountered in designing sidewalk grades is the up-hill corner at the intersection of two streets both of which have steep grades. If the sidewalks on both streets slope downward toward the gutters, a wall, steps, or some equivalent construction seems to be necessary.

The illustration shows such a corner at the intersection of Circular avenue and Sunnyside avenue, San Francisco· This is an unusually difficult corner because the streets are not at right angles but form a "switchback." The height of the wall is so great as to be dangerous and it is rightly furnished with a railing to prevent accidents. While we are not informed as to the conditions not shown by the photograph, those that are evident indicate that some improvements could be made here. For instance, the large steel pole is placed at the narrowest part of the sidewalk, where it offers the maximum obstruction. It would appear to be possible to greatly improve this condition by placing the pole at the end of the curved curb on either street, or even one on each street, if necessary. Also the height of the wall could have been reduced by making it parallel with the upper rather than the lower street. We would suggest, also, that steps in place of the wall would look better and greatly increase the capacity of the sidewalk and shorten the walk around the corner; the foot of the flight being at the line of the foot of the present wall, and their top along a line parallel to the upper curb and passing through the near end of the present fence.



SIDEWALK INTERSECTION IN SAN FRANCISCO.

# Sewerage and the Law

By John Simpson

> Most court decisions have confirmed the broad powers of municipalities over sewer construction and maintenance, which the courts can not abridge; but the state can modify or restrict them; and they must be exercised in a reasonable manner. The regulations of most health boards, state and local, have the force and effect of law.

### POWERS OF MUNICIPAL AUTHORITIES.

As a general rule, power to construct and maintain necessary sewers and drains is expressly conferred by the charter of the municipality, or by statute; and this power is usually liberally construed in favor of the municipality. In re De Peyster, 80 N. Y. 565; Anderson v. Lower Merion Township, 217 Pa. St. 369, 66 Att. 1116; Boyce v. Tuhey, 163 Ind. 202, 70 N. E. 531. Aside from the grant of express power, however, the power to construct and maintain adequate sewers is usually held to reside in all municipal corporations unless expressly denied to them by the legislature. Ft. Wayne v. Combs, 107 Ind. 75. 7 N. E. 746. The establishment of a sewerage system is generally looked upon as an exercise of the municipality's police power. Indeed, the right to exercise this power is considered of such importance to the public welfare that it is held it cannot be contracted or granted away. New Orleans Gas Co. v. Drainage Com., 197 U. S. 453; Metz v. Ashville, 150 N. C. 748, 64 S. E. 881.

Although, as a rule, the right to decide upon the necessity for and location of sewers and to order their construction, is vested in the municipal council or similar body, sometimes in conjunction with the mayor (Lingle v. Chicago, 172 Ill. 170, 50 N. E. 192; Anderson v. Endicott, 101 Ind. 539; Draper v. Fall River, 185 Mass. 142, 69 N. E. 1068) the power is sometimes conferred upon a department of public works, board of sewer commissioners, or other specified body. In re Wheelock, 51 Hun 640, 3 N. Y. Supp. 890, affirmed 121 N. Y. 664; in re N .Y. Inst. for Instr. of Deaf and Dumb, 55 Hun 606, 7 N. Y. Supp. 860.

In Maine, in which state municipal corporations have no power to construct sewers unless it is expressly conferred upon them, the power to construct sewers is, by general statute law, delegated to the municipal officers, a body distinct from the town itself, and for whose action the latter is not liable. Atwood v. Biddeford, 99 Me. 78; 58 Atl. 417; Bulger v. Eden, 82 Me. 352, 19 Atl. 829. In Chicago, the power belongs to the city and not to the Sanitary District of Chicago. Chicago v. McChesney, 240 Ill. 174, 88 N. E. 560.

The duty of constructing sewers may, of course, be made mandatory on municipalities by statute; but in the absence of such mandatory legislation, the general rule is that the municipality is the sole judge of the necessity or desirability of sewers, and their power of constructing and maintaining is therefore discretionary as to place and time, nature, capacity, number and cost. So long as the municipality does not exceed the limits of this power, the courts will not interfere with its exercise. Columbia v. Brooke, 214 U. S. 138; Clensay v. Norwood, 137 Fed. 962; Burton v. Syracuse, 37 Barb. (N. Y.) 292; Mills v. Brooklyn, 32 N. Y. 489; Michener v. Philadelphia, 118 Pa. 535, 12 Atl. 174; Fair v. Philadelphia, 88 Pa. St. 309; Henderson v. Minneapolis, 32 Minn. 319, 20 N. W. 322; St. Albans v. Noble, 56 Vt. 525.

Courts have no power to issue a mandatory injunction requiring a municipality to construct a sewer in a particular manner irrespective of the exercises of discretion vested in the municipal authorities to determine the practicability of the sewer, the availability of taxation for the purpose, and like matters. The exercise of this authority is primarily vested in the municipality and not in the courts. Vicksburg v. Vicksburg Waterworks Co., 202 U. S. 453.

### STATE BOARDS OF HEALTH AND THEIR POWERS

The preservation of the public health is undoubtedly a proper and necessary exercise of the police power of the state. It is universally conceded that to prevent the spread of disease, and to perfect healthful and sanitary conditions, the government may enact laws and create boards invested with powers for that purpose.

The legislatures of nearly all the states have made express provisions for the establishment of state boards of health, charged with the general supervision of the sanitary condition of the state, whose duties are to examine into existing conditions, gather vital statistics, advise legislation, and make rules and regulations for the prevention of disease and the promotion of the public health. The statutes of the various states are very similar in their terms. In some states the establishment of state boards of health antedated the organization of local boards; in others, the legislature provided for both at the same time; though in the majority of cases their creation was subsequent to that of the local boards. Of recent years the tendency has been to increase the powers of the state boards at the expense of the local boards, and many functions are now discharged by them which were once considered the province of the city or county authorities.

Boards of health cannot, by their rules and regulations, enlarge or vary their statutory powers, and rules and regulations which are inconsistent with the statute creating the board and defining its powers or antagonistic to the general laws of the state are invalid. In re Keeney, 84 Cal. 304, 24 Pac. 34; Potts v. Breen, 167 Ill. 67, 47 N. E. 81. In re Smith, 146 N. Y. 68, 40 N. E. 497.

Frequently state boards and boards of subordinate political divisons exist together; the enactment of a law creating the one does not necessarily repeal that creating the other, but the statutes should be construed together. In a number of states, the state boards are required by statute to advise with the local authorities as to water supply, drainage, and similar matters; and in many others plans for new water supplies and sewerage systems must be approved by the state health authorities.

It is a general rule that, within certain limits, boards of health, both state and local, may be authorized by the legislature to make rules and regulations for the protection of the public health, and such rules and regulations have the force and effect of law within the district over which the jurisdiction of the board extends. Isenhour v. State, 157 Ind. 517, 62 N. E. 40; Hurst v. Warner, 102 Mich. 238, 60 N. W. 440; People v. Vandercarr, 175 N. Y. 440, 67 N. E. 913; People v. Special Sessions, 7 Hun. 214. But the extent to which this power may be delegated is a question of great difficulty.

A provision in the charter of a city empowered the city council to establish a board of health and define its power and duties. This clause was held to contain no warrant to the common council to delegate to or confer upon the board the powers and duties which they themselves were directed to exercise; otherwise there would be two legislative bodies within the city, with concurrent jurisdiction over this branch of its municipal affairs. State v. Street Com. of Trenton, 36 N. J. L. 283.

Where the legislature has authorized a board of health to legislate upon certain specified subjects, the courts can not review the acts of the board in pursuance thereof, in respect to matters within its jurisdiction. People v. Board of Health of City of New York, 33 Barb. 344.

The construction of private drains and sewers in violation of provisions inserted by a board of health with statutory power to determine the manner in which the drainage of buildings erected within the municipality shall be carried out may, under the New York statute, be enjoined by the board. Health Department City of New York v. Lalor, 38 Hun. 542.

The New York courts have held that, under the express provisions of the statutes providing for the organization of local boards of health, while the board of health of a town may not summarily execute its orders as to the abatement of a nuisance by going outside of the boundaries of the town for that purpose, it may invoke the aid of the court by injunction, to restrain a violation of its order and to enforce the abatement of the nuisance (in this case the discharge of sewage through a sewer of an adjoining municipality), although the cause thereof arises in an adjoining municipality. The facts of the case were that the city of Rochester acquired lands in the adjoining town of Brighton, opened ditches thereon and constructed sewers which discharged into the ditches near the boundary between the city and the town. The sewage was thus carried over the town lands into a creek. The board of health of the town of Brighton passed a resolution declaring that such discharge of sewage was a nuisance, ordered it to be suppressed and authorized the commencement of an action to restrain a violation of the resolution· The city in violation of the order continued the nuisance, which the board of health sued to enjoin. The New York Court of Appeals held that an action was maintainable to enforce the order and to restrain the continuance of the nuisance; that while the board could not go into the city and interfere with its sewers, it could enforce its orders and prevent the discharge of the sewage upon the lands of the town where it created a nuisance; and that the order related to a matter within the jurisdiction of the board. Gould v. Rochester, 105 N. Y. 46 reversing 39 Hun. 79. See also Bell v. Rochester, 58 Hun. 602, 11 N. Y. Supp. 305.

The local board of health of a town appointed by the local municipal government, sought to enjoin the board of freeholders of a county from discharging sewage from the public county buildings into a creek, so as to constitute a nuisance. Without deciding the point, the court questioned whether defendants, bound as they were by law to maintain county buildings, could be placed on the same footing in this respect as individuals. State v. Freeholders of Bergen, 44 N. J. Eq. 173.

### RECENT SEWER LEGISLATION

Sewer legislation has been abundant in recent years. In many states statutes have been passed requiring the approval of the state board of health to the proposed installation of sewers and sewer systems by individuals and corporations, including municipal corporations, and giving the state boards other powers in respect thereof. These statutes, of course, may vary somewhat in their terms, and the limits of space prevent their details being given in this article. Those passed down to 1917 may be found in detail in Public Health Bulletin No. 87, November 1917, entitled "Stream Pollution," issued by the Public Health Service of the Treasury Department. Among the states which have passed such statutes are California, Connecticut, Illinois, Indiana, Kansas, Florida, Maryland, Massachusetts, Michigan, New Jersey, New York, North Carolina, Pennsylvania, Ohio, Texas and Wisconsin.

As a rule, appeal may be had from an order of the state board of health to the district or superior courts of the state, by persons or municipalities feeling aggrieved by such orders, and on the other hand, the state boards of health may resort to these courts to enforce obedience to their orders.

### CONSTITUTIONALITY OF OHIO STATUTE.

In State Board of Health v. Greenville (1912), 86 Ohio St. 1, the Ohio Supreme Court was called on to pass upon the constitutionality of the state statute of 1908 authorizing the state board of health to require the purification of sewage and public water supplies and protect streams against pollution. The constitutionality of the act was assailed chiefly because it provided for compulsory arbitration and because it coerced city officials into compliance with the orders of the state board of health. On these points the court gave its opinion in the following language, which is in large measure applicable to statutes of a similar nature more recently passed. "This particular legislation now under consideration is designed to preserve and protect the public health and comfort, and, therefore, falls directly within the police power of the state. This power includes anything which is reasonable and necessary to secure the peace, safety, health, morals and best interests of the public. It is now the settled law that the legislature of the state possesses plenary power to deal with these subjects so long as it does not contravene the Constitution of the United States, or infringe upon any right granted or secured thereby, or is not in direct conflict with any of the provisions of the Constitution of this state, and is not exercised in such an arbitrary and oppressive manner as to justify the interference of the courts to prevent wrong doing and oppression * * * The powers of a municipal corporation are delegated powers. It is a creature of statute over which the general assembly of Ohio has as sovereign control as it has over any other part of the territory embraced within the state limits, and the municipal legislature has such power only as the legislature of the state confers upon it, and it may grant or withhold at pleasure. A municipality is at best but a mere agency of the state, and its right to control its own local affairs rests wholly on the general grant of powers by the general assembly of the state. The state is still the sovereign and may extend, limit, or revoke these powers at will. In granting to a municipality certain powers to be exercised for the benefit of the public health of that municipality, the state has not relinquished its authority and control in this important particular over any of the territory contained within the limits of the state. The duties and powers of the state board of health extend throughout the state, irrespective of political divisions or territories embraced within municipalities * * * The provision in this legislation by which a municipality may challenge the judgment of a state board of health and submit the question to a board of arbitration composed of men skilled in sanitary work is a most liberal provision so far as municipalities are concerned, and is far more liberal than many of the statutes relating to the powers of a state board of health. There is no theory upon which a mere agency of the state has a right to litigate the right of the state to enforce, through any agency it pleases, sanitary rules and regulations for the preservation of the health and comfort of all the people of the state."

What had been said with reference to the first contention was held to apply equally to the second, the alleged coercion of city officials. "The state does not seek to control the discretion of the municipal authorities in this matter, but on the contrary refuses to commit to them any discretion touching the particular matters committed to the care and control of the state board of health. In so far as they are charged with any duty in reference to the carrying out of the orders and discretions of the state board of health, they are ministerial officers only * * "

### MARYLAND AND MONTANA DECISIONS.

In Welch v. Coglan (1915), 126 Md. 1, it was held that chapter 810 of the Maryland Acts of 1914, conferring upon the state board of health the power and authority to order the installation of water supply systems and systems of drainage and sewerage in any county, municipality or district, subject to the conditions and limitations contained in the act, is constitutional, but the reasonableness of the board of health's exercises of the powers conferred upon it by the act is always open to review by the courts. In the main, the Ohio and Maryland statutes are similar, but there are points of dissimilarity between them.

In an action by Miles City against the state board of health of Montana to annul an order issued by the board, prohibiting the city from emptying sewage into the Yellowstone river, it was held, Miles City v. State Board of Health (1909), 39 Mont. 405, that the fact that the state board of health did not hear testimony before it made an order prohibiting a city from polluting a stream which is a source of water supply for domestic uses, is not a valid objection to the order. Section 1566, Montana Revised Codes, under which the board acted, does not provide for a public trial, but contemplates an ex parte investigation by the board. The city was held to have the burden of showing, on appeal to the district court, that the order was not justified; hence, where it produced no evidence whatever, and the order, upon its face, bore no evidence of its own invalidity, the order was held valid.

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## Danger Signal for Safety Isle.

Safety stations or isles of safety are located along the street car track in Market street, San Francisco, chiefly as passenger stations. Several accidents have occurred by automobiles running into these at night and the board of supervisors has placed on each of them, on the end facing the traffic, a danger signal consisting of an electric light with a red globe. These have been appreciated by the motorists and approved by the Good Roads Bureau of the California State Automobile Association.

DANGER SIGNAL ON ISLE OF SAFETY.

# Millville's Sewerage and Water Supply

**By Boyd Trescott**

A borough of 500 population used a sewer system for four years before it had a public water system, flushing it with roof water. The sewer cost 25 cts. a foot, laid. Reduction in fire insurance rates more than equaled fire hydrant rental.

The borough of Millville, Pa., was incorporated in 1892 and in 1899 had a population of between 500 and 600. It is situated on the east bank of Little Fishing Creek, the land for a mile east of the creek sloping gradually toward the west, the highest point being a knoll about 400 feet east of one of the main highways. The land here is a very close clay loam with a hardpan sub-soil and with water-bearing shale rock at depths varying from six to twenty feet. This made the construction of sumps and cesspools for disposing of the house wastes impracticable, as there would be no outlet for their contents and the ground water frequently rose to within a few feet of the surface.

### THE SEWERAGE SYSTEM.

Although small, the town was closely built up and the problem of disposal of house wastes became serious, and in 1899 more than two-thirds of the property owners, in both number and interest, along two of the principal streets petitioned the council that sewers be constructed and the whole cost assessed upon the property owners. Although there was no public water supply for use in flushing sewers, it was decided to construct them and, by careful observation, determine whether it would be necessary to construct flush tanks to be operated by the overflow from certain springs. In the fall of 1899 about half a mile of sewers was laid on two streets with grades ranging from one per cent to seven per cent. The outlet was of 8-inch pipe and the two branches of 6-inch pipe. The pipe cost 5.8 cents per foot and was laid at depths varying from 4 to 7 feet at an average cost of 19 cents per foot for digging, laying the pipe, and backfilling. Thirty houses were connected at once. Provision for flushing was made by connecting to each line of sewer the roof-water leader from a building at its upper end. Four years later a public water supply was introduced, but even before this, the mains kept perfectly clean by the flushing provided by the roof water, and during its twenty years of operation, the sewer has never caused any trouble.

### THE WATER WORKS SYSTEM.

In 1902 it was decided to build a water plant and a franchise was given to a private company for this purpose, specifying where the mains were to be laid and that the pipes should be not less than 4 inches on branches, with 6-inch connections between reservoir and town. The borough council agreed to pay $20 per hydrant per year for at least twenty fire hydrants. There were no springs or streams available which would give sufficient supply by gravity and it was determined to drill wells. An 8-inch well was drilled on the knoll at the highest point of the borough and at 500 feet depth there was a flow of 19 gallons per minute, which did not increase when the depth was continued to 1,000 feet. The water obtained was so impregnated with sulphur and iron that it could not be used and the project for a bored well was abandoned after spending more than $4,000. A shallow well was then dug near the creek and at a depth of about 15 feet loose sand was found which furnished a supply that seemed to be ample. This supply has been used since 1903, when the works were constructed and the consumption of water has increased from 16,000 gallons a day to more than 27,000. For several years the water was pumped by a gasoline engine but later this was changed to kerosene.

The fire hydrants were located not more than 1,000 feet apart and, with the 1,000 feet of fire hose bought by the council, it is possible to place two effective fire streams on almost any building in the town. It is found cheaper to pay the $20 per year for additional fire hydrants than to buy and keep on hand a larger quantity of hose, in addition to which the close spacing gives better pressure. Water is pumped to a reservoir on the knoll referred to, 190 feet above the creek, and gives a pressure on the main part of the town of about 80 pounds and a fire stream at 65 pounds . Just after the completion of the works, the Underwriters Association made a general reduction in insurance rates which more than made up, by the lowered cost of insurance, for the $400 paid out for fire protection.

# Economy in Brick Pavement Construction

Deep gutters are objectionable. Curbs, either integral or independent, are a waste of money for monolithic construction or where bituminous filler is used. Penetration macadam shoulders recommended. The greatest present need is for better understanding of sub-soils. These opinions were expressed by Will P. Blair.

The vice-president and former secretary of the National Paving Brick Manufacturers' Association, Will P. Blair, in a paper before the American Society for Municipal Improvements, made several suggestions for modification of common practice in constructing brick pavements which would prove economical. One of these, the use of a rolled broken-stone base, instead of concrete, has already been referred to in the article entitled "Pavement Foundations," in the November 15th issue of Municipal Journal and Public Works. The others are described briefly in this article.

### DEEP GUTTERS.

Gutters are sometimes found of a great depth, provided under the impression that they and the resulting high crown are necessary for surface drainage. Even if necessary for dirt roads, they are not for brick, they add to the cost, are inconvenient, dangerous and unsightly.

### CURBS.

Where there are no sidewalks, curbs as an edging along a brick pavement are unnecessary in monolithic or semi-monolithic construction, or where asphalt filler is used. "The practice of making the curb an integral part of the foundation is more harmful than beneficial. A trough is formed, which holds the water, permitting it to subside into every chance crevice and opening in or underneath the pavement, instead of the needful provision for an unimpeded flow off of and away from the pavement." A curb independent of the base is of little use; in frost, raises it or, with the earth outside moist, it is easily pushed away from the base. A gravel, broken stone or slag embankment or shoulder is a far better protection, and one penetrated with bituminous material is far better. For brick-paved country roads, therefore, "a curb is largely a useless and costly appendage" and a waste of $3,000 to $5,000 a mile. This does not apply to certain special conditions upon hillsides and through heavy cuts, where a curb may be necessary.

### SUBSOIL CONDITIONS.

Destruction of pavements by traffic has received more attention than that by the subsoil conditions, although the latter exert a far greater influence on the durability of pavements than does traffic. We cannot even name or classify the various characters of soils with respect to their effect upon a pavement laid upon them. We drain or do not drain in a haphazard way, and generally continue the same design of pavement and method of construction for five, ten or twenty miles without making any change however different may be the soil conditions encountered. We are unable to direct how to deal with sand, clay or muck subsoils. In fact, the terms themselves do not convey any exact meaning, nor are there any others which do, concerning conditions as well as composition of the soil. "The absurd and unscientific way in which we have dealt with the underneath soil conditions in highway improvement, or our failure to deal at all with them, should bring us to realize that as highway engineers we have yet some work to do. To place reliance of sufficient support of traffic upon certain artificial slab strength of costly structure, without knowledge of what is already in existence and regardless of its worth for that purpose or without knowing with what small relative expenditure certain treatment may render its condition adequate, is but an acknowledgment of inability to economize and prevent great waste."

We need to be able to classify soils according to their capillary properties, then to determine what treatment to give each class in order to produce a stable foundation. This will be difficult, but must be done if we are to be sure of our ability to build satisfactory roads under all conditions.

# Lawrence Sewage Treatment Studies

Excerpts from the latest annual report of the Massachusetts Department of Health. The details of the activated sludge process must be varied to suit different sewages; the process modifies but does not purify; too much sludge may be used; only one per cent of the applied oxygen is needed to produce stability. Studies were made of the progressive flow through sedimentation tanks. For sprinkling filters, the rate per acre can be increased as the square of the depth, or more. Acid wastes were found in sewers which dissolved iron and concrete but did not affect vitrified pipe or brick.

In the report of the Massachusetts State Department of Health for the year 1917, which has recently been published, are given the customary detailed descriptions of results obtained in the several experimental tanks and beds operated at the Lawrence Experiment Station, some of which have been in practically continuous operation for sixteen years. Most of these are in the nature of "progress reports," but concerning some of them tentative conclusions have been drawn. In the following paragraphs we have endeavored to present the most instructive of these.

### ACTIVATED SLUDGE.

The activated sludge method is called "purification by aeration and growths" by the Lawrence experiment station, which is perhaps more accurately descriptive but is too long a name for common use. Strictly speaking, however, the name is applied by the station to include the use of slate tanks as well as activated sludge tanks. The year of the report was the fifth of the experiments upon the activated sludge process.

Two slate tanks were in operation and two activated sludge tanks, one of the latter on the fill and draw plan and the other on the continuous plan. The latter consisted of three compartments made of sections of 30-inch vitrified pipe set on concrete conical bottoms and about 75 inches high above such bottoms, with a capacity of 230 gallons each. The compartments are connected at the top in series and the first two have baffles across the center extending three feet deep. Until October 1st air was applied at the average rate of 0.94 cubic foot per gallon, when it was increased to 2.19 cubic feet per gallon of sewage. The amount of air applied appeared to be insufficient but represented the capacity of the air compressor used.

From these experiments it was concluded by H. W. Clark, who was in charge of the experiment station, that "it becomes increasingly evident, as stated in previous reports, that different sewages and sewages of different strength require very different periods of time and volumes of air if satisfactory results are to be obtained. The resulting effluent is, broadly speaking—unless excessive volumes of air and periods of time be given—a modified sewage but not a purified sewage. It is also evident that tanks operated on the fill and draw principle can be more efficient with a unit volume of air and time than tanks operated on the continuous principle. It is also evident that tanks containing slate produce purification with but a fraction of the air necessary in tanks not containing such material. Studies of sludge, not sufficiently developed as yet to summarize, seem to show that it is easy in this process to use an uneconomical and, in fact, detrimental percentage of sludge, and good results cannot be obtained unless sufficient air is used to produce sludge of a certain color and physical and chemical character."

In a previous report it had been stated that the increase of organic nitrogen which was found to take place in activated sewage sludge was largely due to the high nitrogen content of the colloidal matter deposited in activated slude from sewage, possibly aided by an apparent increase of nitrogen due to removal of carbonaceous matter by oxidation. This point was studied during the year.

The effect of sterilizing chemicals on the activated sludge process was studied and it was found that 5 c.c. of chloroform added twice daily reduced the number of bacteria but without sterilizing the sludge and sewage, and prevented the successful operation of the tanks. Mercuric chloride effected sterilization and completely stopped the action of the activated sludge—that is, no purification occurred. Experiments had been made and were being continued on the stabilizing effect of iron salts on the sludge, as it had been found to have such effect on Imhoff sludge. No results were given in the report.

During the year an effort was made to determine the actual amount of oxygen necessary to stabilize sewage of average strength, and the time required. It appeared that the average amount of dissolved oxygen necessary to produce stability in the sewage treated was 4.26 parts per 100,000 or 4¼ pounds for 12,000 gallons, or 350 pounds of oxygen per million gallons of sewage. In the activated sludge test, something more than two cubic feet of air was used per gallon of sewage, which amount was equivalent to the use (or rather waste) of 37,240 pounds of oxygen per million gallons of sewage—one hundred times the amount required to produce stability.

### TIME OF SEDIMENTATION.

When water or sewage passes through a settling tank, the time for sedimentation or for passage of the sewage through the tank is generally expressed as the time it would take to fill the tank at the average rate of flow of the liquid under consideration. It is realized by all who are familiar with water and sewage treatment that part of the liquid passes through in much less time, while another part remains much longer in the tank, this varying considerably with the method of constructing and operating the tank.

Experiments at Lawrence were made on two tanks which were being operated at such theoretical rates that the sewage was 6 hours, 9½ hours, 10½ hours, etc., in passing through. The liquid on entering was treated with either salt or ammonium chloride so that its appearance at the outlets of the tanks could be determined easily, and also the proportion which the effluent at any given time contained of the sewage so treated. (These tanks were circular in the plan and it seems probable that the results founds with them would differ from those in a rectangular tank.) In the case of one tank, when the theoretical time of filling was 10½ hours, certain volumes of the applied sewage appeared at the outlet in practically one hour, 50 per cent appeared in 7½ hours and only after 35 hours had all finally passed through. The liquid did not pass through as a more or less compact body but as a progressive mixture. Theoretically, when a tank is operated on a 10-hour basis, 10 per cent of the entering sewage should appear at the outlet in the first hour, 9 per cent additional in the second hour, 8.1 per cent additional in the third hour, etc. This theoretical rate of progress was approximated by the actual results. During these experiments the sewage was being agitated with air.

Similar experiments were made in a tank 30 feet long 31 inches wide and 30 inches deep, the entering sewage passing below a baffle and rising above a baffle near the outlet, there being no agitation with air. When the flowing-through period was theoretically four hours, about 50 per cent of the entering liquid reached the outlet in four hours and it was 15 hours before all of it had passed from the tank. Where the times of passage were 6 hours and 8 hours, a little over a half had flowed through in those periods, but 20 hours and 27 hours respectively had passed before all had flowed through. In this tank the temperature of the water in different parts and depths varied from 38 degrees to 52 degrees, and these differences in temperature undoubtedly caused the water to flow in more or less stratified layers. Experiments along this line are being continued.

### TRICKLING FILTERS.

Experiments were continued with three trickling filters, one of which had been put into operation in 1899 and the others in 1913 and 1914. One of the conclusions from the study of these filters was that "trickling filters of a considerable depth are much more economical and efficient than shallow filters, and this efficiency is due to two reasons: (1), to the fact that the sewage is relatively a much longer time in passing through the deeper filters, and (2), to the progressive mixture of the applied and the held sewage in these deep filters."

The experiments indicated that the greater efficiency of deep filters is somewhat more pronounced with a fine material (of such size that all pieces will pass a 1½-inch screen and be retained on a ¾-inch screen) than in the case of filters where the average volume of the pieces ranges from 25 to 30 c.c. Also that, for the maintenance of high rates with a good degree of purification, the finer material is more desirable than the coarser. Even with the latter, however, a filter 10 feet deep can be operated at a rate per foot of depth twice that of a filter 4 feet deep; or the actual rate in gallons per acre daily of a 10-foot filter can, even with the coarser material, be two and a half times as great as that of a 6-foot filter, while when using the finer material the rate of the 10-foot filter can be at least four times as great as that of a 6-foot filter and with equal purification results.

### ACID IN SEWERS.

While investigating the treatment of wastes from various manufacturing processes, a spent sulphuric acid liquor was found which contained 1.95 per cent free acid, and another sample of partially spent hydrofluoric acid, so called, which was 2.45 per cent free acid (probably all sulphuric acid, however, as it did not etch the bottle containing it). It was found that these wastes dissolved 1.07 ounces and 1.42 ounces respectively of iron per gallon of liquor in 12 hours. The same liquors were tried on concrete blocks and at first the action was quite energetic, carbon dioxide being evolved; but after 24 hours this action had nearly ceased, the surface of the blocks being then largely composed of sand, the cement having been decomposed and the interstitial spaces filled with calcium sulphate. "When the blocks were placed in running water the calcium sulphate was dissolved, leaving the blocks ready for another attack by the acid; and by alternately applying acid and water, the blocks were completely disintegrated. As similar conditions would prevail in sewers, it is evident that such wastes should not come in contact with concrete or iron. The action of such liquors on vitrified pipe or brick was much slower, and after several months' contact with these wastes there was practically no evidence of injurious action.

# Use of Federal Highway Equipment by States

As noted in our issue of May 10, 1919, the Secretary of War last year turned over to the Secretary of Agriculture about 20,000 trucks and other kinds of equipment useful for highway work, to be used by the several states in the construction of roads for which federal aid had been appropriated. How the state of Texas systematically arranged for the use of its quota of hundreds of trucks was described by Rollen J. Windrow, state highway engineer, in a paper before the Association of State Highway Officials last month. An abstract of the paper is given below.

The highway departments of the various states operate on two different bases. In twelve or more the state department takes the initiative in all matters pertaining to the construction and maintenance of state highways. But in the large majority the initiative rests with the county, parish or township, and the state highway department functions only in a co-operative or supervising capacity. In Texas the county is the operator, and consequently in that state the main idea is to get the equipment in the hands of the counties as quickly and with as little expense as possible.

The equipment supplied to the states may be classified as trucks, and all other. Up to the present, trucks far outnumber all other equipment allotted. In Texas, at least, the need for trucks will be largely supplied by the federal equipment, but in all probability not the need for portable crushers, road graders, steam shovels, rollers, tractors, concrete mixers, locomotive cranes, industrial track, etc.

The first definite information about the equipment was received in April, 1918; and in May the Texas Highway Department created a new division of the department known as the Federal Equipment Appropriation Division, in charge of a superintendent whose sole duty is the handling of the federal equipment.

The Bureau of Public Roads required that title to the equipment remain with the state highway department while the equipment should be in serviceable condition. It was therefore decided that it be distributed to the various counties on a lease basis and that the counties be required to execute a legal lease agreement, acknowledging accountability for the property received by them and accepting the stipulations as to conditions under which the equipment was to be used.

To protect its interests, the state department considered it necessary to provide for a regular inspection of the equipment after it was placed in the hands of the counties. Therefore the counties, besides paying reimbursement of receiving charges, were also required to pay an annual rental to cover the cost to the highway department of administering the control and inspection of the equipment. It had been estimated that a rental of two dollars per month on trucks would be sufficient to cover this cost and this is the rental which the counties are required to pay until the end of the first fiscal year. At the end of that time, this rental may be increased or decreased as found necessary and desirable.

### APPORTIONING EQUIPMENT.

On the basis of the states receiving 20,000 trucks, Texas might expect her normal share of six per cent, or 1,200 trucks. Assuming that some of these would turn up unserviceable, that others would be needed in handling the federal equipment, and still further reserving a surplus for unexpected contingencies, it seemed safe to take 1,000 as the number which the counties might safely expect to receive. Using this as a total number, a table of distribution percentages was worked out for each of the 253 counties in Texas. The basis of this distribution is similar to that used by the Bureau of Public Roads in apportioning aid among the states, that is, on the basis of area, population, and mileage of roads; each of the three factors having equal weight.

Each county was then offered the number of trucks to which the calculation made it entitled. In making the offer, the counties were asked to submit their requests in the form of answers to a questionnaire which gave definite information as to the number of trucks the county would accept, whether less than or in excess of their allotment, information as to mileage of roads in their counties, expended and contemplated bond issues, amount of annual road and bridge fund, data in regard to the organization for road work, and other pertinent information. As other states have probably found in dealing with county authorities, it is exceedingly difficult to get information from all counties on any subject whatever. The State Highway Department of Texas used this opportunity, where they were giving something to the counties, as the best means of getting a large amount of miscellaneous information which had long been desired and which it had been unablee to obtain from all counties. The plan was almost uniformly successful and there are only a very few of the counties who have not fully and gladly replied to the questionnaire.

### LEASE AGREEMENT WITH COUNTIES.

Regulations governing the use of the trucks are embodied in the lease agreement. The important points of this are as follows:

1. The truck is identified by state registration number, motor number and serial number, and by make and capacity.

2. Every item of equipment furnished on the truck is listed in the lease agreement and the county assumes full accountability for this equipment. This provision protects the state in case it is later found necessary to recall the truck from the use of the county.

3. The county agrees to keep the truck in a proper state of repair and good working order, due allowance being made for natural depreciation with use.

4. The truck is to be used on highway work only and on the public roads under the jurisdiction of the county commissioner's court.

5. The State Highway Department is to have full access to the truck at all times for the purpose of inspection, to insure that the provisions of the lease agreement are being carried out.

6. The county agrees to provide covered storage for the truck when not in use or to keep it covered with a waterproof tarpaulin, and further agrees to paint the truck once a year.

7. The county accepts full liability for the expense of receiving such equipment as is delivered to it. The county makes a payment of $150 at the time of executing the lease agreement, and agrees to pay such further sum as may be later assessed. Also, at the time of executing the lease agreement the county makes a rental payment at the rate of two dollars per month for the time remaining until the end of the fiscal year.

8. Provision is made for recall of the truck from the county by the State Highway Department upon giving two months' notice of such intent to recall and upon reimbursement to the county by the State Highway Department of all unearned rental and a certain per cent of the receiving charges which may have been paid by the county. The per cent of receiving charges to be refunded ranges from 100 per cent when the truck is recalled at any time up to three months after delivery of the truck down to 50 per cent when recalled after twenty-seven months after delivery of truck.

Some counties could receive their trucks by direct convoy, and the total cost, including making any repairs necessary, might not exceed $40 or $50 per truck. Other counties in the extreme western part of the state would receive their trucks by freight, for which the charges might be over $300 per truck. Also, it would cost as much to deliver a worn-out 2-ton truck of inexpensive make as a brand-new 3-ton truck worth two or three time as much. It seemed unfair to require the counties to pay as much for one as for the other, and the department established a scale of charges so that every county pays the same for the same make and type of truck, the rates being such that the total payments will cover the total receiving charges paid by the department.

### DISTRIBUTING TRUCKS.

For distribution purposes, about a dozen distribution points were selected such that the longest drive to any county seat from the nearest distribution station does not exceed 200 miles and in the majority of cases is less than 100. Other factors affecting the selection of distribution stations were available storage, garage and shop facilities, availability of labor, railroad facilities, and highway connections to neighboring counties. In several cases storage space was secured at an army post or camp, in others at county fair grounds or warehouses. Thus the expense of renting storage space has been practically eliminated, and only at one station, and there for only a part of the time, was it necessary to rent space for storing and repairing trucks. An inspector was sent to each station to make the arrangements for storage, purchase of supplies, and employment of labor.

When the State Highway Department at Austin receives notice by wire that certain trucks are available for immediate shipment, complete shipping instructions are wired to the Bureau of Public Roads, which are transmitted through the chief of the Motor Transport Corps to the Army supply depot where the trucks are stored. The trucks are then shipped to the distribution station specified and an inspector immediately sent there to receive them. As soon as they arrive they are checked over and a complete list of all equipment is sent to the office of the state department, which then sends acknowledgment of receipt to the Bureau of Public Roads, the chief of the Motor Transport Corps, and the shipper, and pays the bills for loading and freight.

The inspector employs a first-class mechanic, and drivers and laborers. The trucks are gone over thoroughly, greased, oiled, their motors tuned up, all necessary repairs made, and they are tried out to make sure that they are in first-class condition. Meantime authorizations are made out in quadruplicate, two going to the county judge, one to the inspector, and the fourth into the office files. The county judge is instructed to have a representative call on a certain date for the trucks allotted to his county, bringing his two copies of the authorization, which are to be signed by this representative and the department's inspector. These two check over the equipment as described in the authorization, the signing of which acknowledges the receipt of it by the county, and each delivers one of the copies to his own office. The trucks are then taken over by the county's representative.

A lease agreement is made out in duplicate and both copies sent to the county judge with a statement of preliminary charges, his signature and that of the four members of the Commissioner's Court are placed on each copy and they are returned to Austin accompanied by a check for the bill rendered. One copy is returned to him signed by the state highway engineer and the other is filed in the state office. Later, when the complete charges against the equipment become known, the county is billed for the balance due.

By the first of December the state had received about 35 per cent of the trucks allotted to it, but so small an amount of other equipment that no attempt had been made to distribute it, it not even being known how much of such equipment the state would receive. What is received is put in serviceable condition and stored and probably all will be distributed next spring under a plan of leasing similar to that employed for the trucks.

### USE OF TRUCKS BY CONTRACTORS.

In the matter of rentals to contractors and force account jobs, the State Highway Department of Texas approves three different schemes on which this may be carried:

1. Where the equipment is available in the county at the time the contract is to be let, the county may advertise for bids on the basis of furnishing the contractor with certain specific equipment.

2. The county may lease the equipment to the contractor for a certain specified cash price, but such contracts must be submitted to the State Highway Department for approval.

3. The county, as a private party, may haul for the contractor on a ton-mile basis at the usual pay for such work, the county using its own trucks and drivers.

In this matter of rentals to contractors and force account jobs, every individual case must necessarily be examined on its own merits and the division engineers of the Highway Department, who are in close touch with all the counties, make recommendation as to what action the department should take in each case.

The State Highway Department intends to exercise its control over this equipment by maintaining frequent inspections. The state is divided into eight dstricts with a division engineer as the official representative of the State Highway Department in each district. Divisional inspectors have been put on in these districts and these men work under orders from the division engineer. Their duties involve the inspection of this federal equipment, submitting necessary reports in regard to the use and possible misuse of this equipment and other matters pertaining to traffic regulations and registration of the motor vehicles. The division engineer, in his visits to counties, also transacts some of this business and in this way the highway department is enabled to maintain a close supervision of the use of this equipment.

### EQUIPPING TRUCKS WITH DUMP BODIES.

Because of the great area of Texas, the expense of having all the trucks brought to one point to be equipped with dump bodies hardly seemed justifiable; nor was it possible to have all the trucks which were going to any one distribution station shipped to that station at one time. As the counties were asked to bear the full expense of receiving the trucks, they should be permitted to decide what type of bodies they wanted on them. Accordingly, this matter was left entirely to the individual counties.

There is one phase of this matter, however, in which the State Highway Department has taken the initiative. It experimented with cutting down the steel ammunition body with which the Nash Quad trucks were equipped and found that this can be made into a practical dump body by removing the steel body from the chassis, cutting same down with a blow torch to a depth of 15 inches, riveting a small angle-iron around the cut edge, and equipping the body with a swinging tail-gate at the back end, and mounting same back on the chassis with a hand hoist attached between the body and the cab. Business firms in Texas do this work at a price which affords a saving of from $100 up over any other steel dump body which the department has thus far been able to obtain.

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# Some Novelties in Concrete Paving

A truck, loaded by a crane, delivers stone for six batches, automatically measured, directly into the mixer skip. Sand is shoveled into skip and measured with one handling.

A piece of concrete road is being constructed at Central Islip, L. I., by the R. W. Smith Corporation in which the contractor is using some interesting appliances and methods for meeting the labor problem by the use of machinery. As one of his machine operators stated, Mr. Smith "believes in buying machinery rather than labor wherever possible."

The pavement in question is a section of the highway running between Islip to the south and Smithtown to the north. The pavement is 16 feet wide, 5 inches thick along the edges and 7 inches along the center and is mixed 1 cement, 1½ sand and 3 broken stone; the sand containing more or less small gravel. This road crosses the railroad at right angles, at a point only about 200 feet from the siding where the contractor has piled the broken stone delivered for the work. The sand is obtained about two miles away and has been distributed in a continuous pile along one side of the road to be paved. The road had previously been graded by use of a Maney scraper, from 2 or 3 inches in some places to 18 in others having been removed from the crown.

For side forms for the concrete, 4-inch steel channels are used, held in place by means of half-inch iron pins driven through holes in the flanges and into the ground. Water for the concrete is brought for a distance of two miles through a line of 2-inch pipe laid along the side of the road, a booster pump being used about a half-mile from the plant to provide sufficient head to lift it into the water tank on the top of the mixer.

For mixing the concrete, a Foote batch mixer with caterpillar traction and discharging the concrete through a chute is used. While the concrete is seasoning it is covered with sandy soil which was removed in grading and piled alongside the road; or, where there was not enough of this, with soil "borrowed" alongside the road.

### HANDLING THE AGGREGATE.

The unusual features are the methods of delivering the aggregate into the mixer. At the stone pile at the railroad siding is a Beyer's auto-crane which is used for loading the stone from the pile directly onto the trucks. The crane also has caterpillar traction. A bucket is used which lifts about three-quarters of a yard of stone at a time, and fills the truck with three or four bucketsfull. The truck used on this work carries 2 2/3 cubic yards of stone. The truck is of a design known as the Brockway, with a special design of dump body, the unusual feature consisting of five partitions in the body dividing it into six equal sections, each section holding exactly the right amount of stone for a batch. Each of these partitions swings from a rod passing across the top of the body, but is held in vertical position by three pins which enter holes in the steel bottom of the body, and which pins can be withdrawn from the holes by means of short-arm knuckle joints operated by turning the supporting rod by means of a handle at the outside of the body. When the truck is to be emptied, the front end is elevated by means of a piston lift, the swinging tail-board is released, and the stone from the first partition is discharged. The second charge of stone is discharged by releasing the first partition by withdrawing the pins as above described, and each successive charge is discharged when desired in the same way. As the compartments all have the same calculated dimensions, exactly the right amount of stone is discharged each time without measuring.

In practice, the truck backs up to the skip of the concrete mixer, discharges the stone from one compartment, and while this is being mixed the skip is lowered and stone from another compartment is discharged into it, and so on, until six batches have been mixed, when the truck returns to the stone pile for a new load. Meantime, another truck has arrived similarly loaded and takes its place for delivering stone into the skip. As batches are mixed at an average interval of 1¾ minutes, each truck stands at the mixer for about 10 minutes. The work at present is about 1,800 feet from the stone pile, and only two trucks are needed, since one can go to the pile, obtain a load and return in less than 10 minutes. The crane can load the truck in 1½ minutes, although 2 or 2½ minutes is probably more nearly the average loading time and there would be no advantage in reducing this time. Each section of the truck holds about 12 cubic feet, and this amount of stone is mixed with 6 cubic feet of sand and 4 bags of cement to make a batch.

As already stated, the sand is piled up in a continuous pile along the side of the road only three to five feet from the edge of the pavement, and is shoveled directly into the skip. In order to measure the sand, a bottomless box of the proper dimensions is set on the flat bottom of the skip and is filled with sand by two or three shovelers. Following this, the stone is dumped upon the sand and the four bags of cement emptied onto the pile, and the aggregate is then discharged into the mixer. The sand box is not removed before the stone is placed in the skip, but it is fastened by means of two chains to a steel brace connecting the tops of the sides of skip, and when the charge is discharged into the mixer, the box swings free and hangs suspended from this cross-brace, returning of itself to the bottom of the skip when this is lowered to the ground.

It can be seen that this method of handling aggregate insures accurate measuring and also eliminates the wheelbarrow gang, and, in fact, all handling of the stone except picking it up by the crane, and requires only one handling of sand. Including foreman and engineers of crane and mixer, the total number of men employed on the work is 20.

The truck body is 4 feet 9 inches wide inside and 1 foot 9 inches deep and the partitions are spaced 1 foot 8 inches apart. Each partition is formed of a 1-inch board with a thin steel plate on each side, the plates being held in place by bolts passing through the board. On the basis of 1¾ minutes to a batch, which lays three square yards, this small gang and apparatus would lay 465 feet of 16-foot pavement a day. As in all cases, there are delays connected with moving the mixer and other features of operation, but the distance actually made is between 400 and 450 feet, although as much as 525 have been laid in a day.

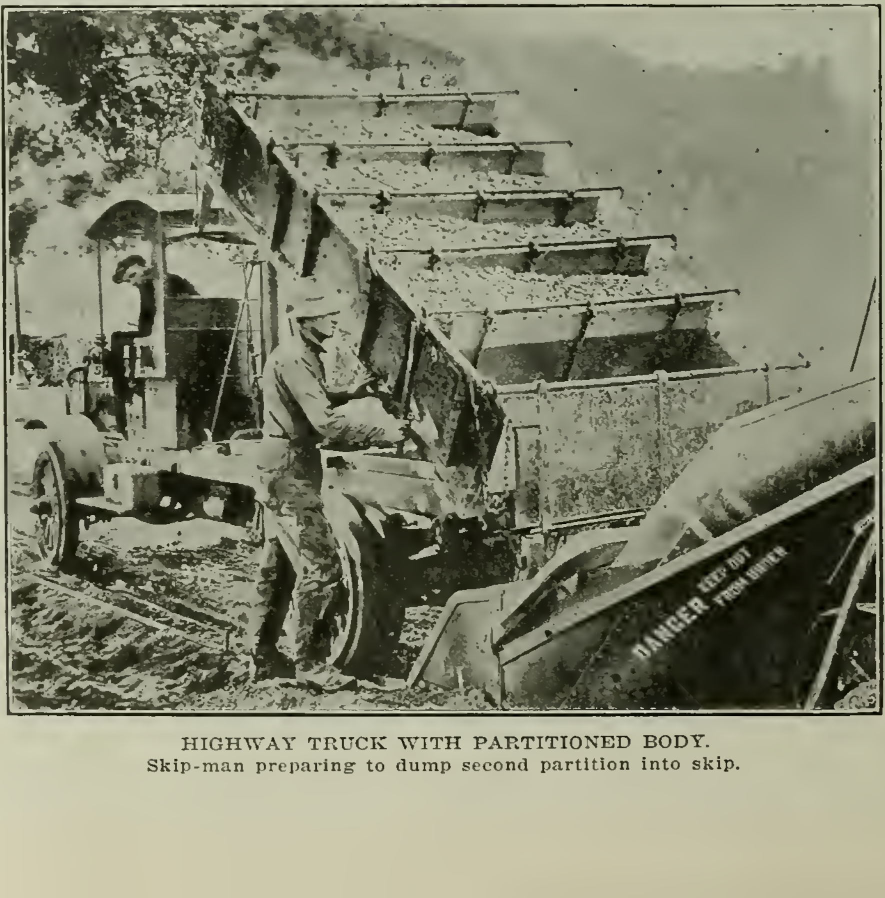
The concrete pavement is struck off by means of a strike board made of a 2-inch by 12-inch plank properly formed on the under edge to give the 2-inch crown desired. The surface is finished by means of a 1-inch board 8 inches wide which is provided with a handle at each end and is used in much the same way that a belt has been used for the same purpose. This also is believed to be an unusual practice.

## St. Louis Filter Notes

The 1919 report of August G. Nolte, superintendent of the filter plants of the St. Louis waterworks, contains a number of interesting matters, among them the following:

It was found that fish in the water above the filters, mostly carp, were making holes in the surface of them, from one inch to mere depressions in depth and as large in plan as one by two inches. The fish varied in size from mere minnows to 6 inches long, averaging 3 inches. The depth (4½ feet) and turbidity of the water above the sand prevented seeing how the holes were made, but it was supposed that they were due to the impact of the fish striking the aluminum hydroxide matting on the surface of the sand, either while swimming downward with the current or while nibbling for food. There was no doubt that the depressions were due to fish, for the holes are always found when fish are present and vice versa. They did not appear to interfere with the efficiency of the filters.

Some of the strainer plates had not been fastened down firmly, the U-bolt nuts not having been drawn up all the way, and this allowed the water to rush out at the edges and throw up mounds of the gravel resting on the adjoining plates. For locating these mounds, a T was made of ¾-inch pipe, the vertical leg 15 feet long and the horizontal about 6½ feet. While the sand was held suspended by wash water, this T inverted, was moved inch by inch across the filter unit parallel to and between each two lateral gutters. Where the gravel surface was level the upright leg of the T would stand vertical, but any unevenness in the surface would tilt it. This investigation also revealed the presence of large mud balls in several of the filters, which were broken up with a rake. Loose strainer plates were found in nine of the forty filters. Repairs to them were made by regrouting the plates, drawing up the nuts and replacing the gravel.



HIGHWAY TRUCK WITH PARTITIONED BODY.
Skip-man preparing to dump second partition into skip.

# The WEEK'S NEWS

**Funds for Indiana Highways Limited—Propose Transcontinental Highway for Canada—Convict Road Work in Florida—U. S. Public Health Service Plans Health Conservation—Malaria Control by Rockefeller Foundation—Improving Water Supplies of Virginia Cities—Atlanta Adopts and Newport Defeats Two-Platoon Plan—New York Aids Policemen—Canton Mayor Removed by Governor—Toledo Cars Run Again.**

## ROADS AND PAVEMENTS

### Highway Program Delayed by Financial Complications.

Indianapolis, Ind.—The financial complications of the state administration have become more involved with the announcement that the state highway commission will not arrange to let contracts for the building of more state roads in 1920 owing to its lack of funds. The commission planned to let contracts before the first of March for the construction of four hundred miles of hard surface roads next year, but Luke Wright, chairman, has now announced that it cannot build more roads because it cannot get the funds. The commission has arranged to build 133 miles of roads and has funds for that purpose. However, the outlook is that the plan for a state system of highways will have to be postponed at least a year, and probably longer, on account of the action of the state tax board in reducing the highway levy from 10 cents on the hundred dollars to 3.9 cents. The last legislature passed a law giving the highway commission a 10-cent levy, but the tax board refused to permit the collection of that amount, although the highway commission and good roads organizations contend that the tax board has no authority to override the action of the legislature. It was stated at the office of the highway commission that the state probably will lose a large portion of the sum it would have received from the federal government if the state tax board had not cut down the levy for road building. It was stated also that as a remedy to the situation a bill will be presented if the special legislature is held to double the auto license fees, which would give the highway commission at least a million dollars extra for next year. The tax board is confronted with dozens of suits to test the new law, and one has been appealed from here questioning the board's right to place horizontal increases on all property, as was done in three-fourths of the counties. If the decision here, which was against the board, is upheld, practically every city and county will be bankrupt next year. Fred Sims, chairman of the tax board, is suggesting in the event of an unfavorable decision by the supreme court that the legislature in special session legalize the horizontal increases.

### Daily Reports on Road Conditions.

Harrisburg, Pa.—The state highway department has begun the making of daily reports on road conditions to meterologists of the weather bureaus in Philadelphia and Pittsburgh. These bureaus will in turn inform motor clubs, manufacturers and the public in general of the condition of the main connected hard-surfaced highways over which east-west winter traffic passes. This service will cover the Lincoln Highway between Philadelphia and Pittsburgh; the National Pike within the boundaries of Pennsylvania; the highway between Chambersburg and Harrisburg; the William Penn Highway between Harrisburg and Philadelphia, and the William Penn Highway between Reading and Easton. Each of these thoroughfares has been divided into sections. Superintendents in the various counties each day will mail to the weather bureaus and to the state highway department cards giving the condition of the roadway by sections. If any marked changes occur during the night, telegraphic reports will be made the following morning. Farmers, manufacturers, automobile clubs and road users in general who wish accurate information regarding the condition of the main traveled roadways mentioned may secure that information either from the weather bureaus in Philadelphia and Pittsburgh or the bureau of information, state highway department, Harrisburg.

### Canada May Duplicate Lincoln Highway.

Ottawa, Canada.—The Lincoln Highway may soon be duplicated in Canada. Definite plans have been formulated for the organization of an association along the same lines as the Lincoln Highway Association, pledged to construct a great transcontinental road from Halifax to Vancouver. A. F. Bement, vice-president of the organization in the United States, has been invited to address the Ontario Motor League in the near future and describe the steps to be taken.

### Extensive Convict Road Work in Florida.

Jacksonville, Fla.—Bids will be asked for and contracts probably be let by January 10, by the state road department for approximately $2,000,000 worth of road construction. This was announced by John E. Gilbert, a member of the department, upon his return from a conference with chairman M. M. Smith at Tallahassee. According to Mr. Gilbert, all of the nineteen convict camps to be maintained by the road department are practically completed and about 750 convicts will be available the first of the year. Three of the camps will be located between Jacksonville and Lake City on state road No. 1; two in Hamilton county on state road No. 2; one in Gadsden and one in Bradford county The convicts will be kept in portable stockades. In providing for their clothing, sustenance and equipment the state road department has assembled large quantities of supplies at Camp Johnson.

## SEWERAGE AND SANITATION

### Urges Nationwide Health Conservation Plan.

Washington, D. C.—"Preventable disease cost the United States four billion dollars less in 1917 than it would had the health conditions of 20 years ago prevailed in 1917. Four hundred thousand less deaths occurred in 1917 than would have had the 1900 death rate prevailed. Annual illness of workers still costs this country two billion dollars each year. One man in every three called by the army was found to be physically unfit." These figures have been given out by Surgeon General Rupert Blue of the United States Public Health Service, in urging a plan for nationwide conservation of health and calling on all health agencies to co-operate in a carefully prepared program. Surgeon General Blue has sent a letter to state and city health officers, to the head of the American Red Cross, the American Public Health Association, the American Medical Association, the National Tuberculosis Association, the International Health Council, the National Safety Council, the American Child Hygiene Association, and other health agencies, suggesting a conference in Washington to consider a health program prepared by the Public Health Service. The Surgeon General points out that practically all of these agencies have under consideration some plan of health conservation and that unless the work can be coordinated and properly directed, little will be accomplished and there will be much overlapping of effort and waste of funds. It is emphasized that the success of the plan will be determined by its direct applicability to the conditions in the different local communities and for this reason the Federal, State and local health officers must co-operate most closely in order to direct the campaign in each community and set a definite objective. The health program to be submitted to the conference has been in preparation for months, experts of the Public Health Service long having foreseen the need of such a nation wide effort. A preliminary announcement of the plan was made at New Orleans at the recent meeting of the American Public Health Association, which gave unanimous endorsement.

### Damages for Typhoid from Polluted Water.

Rochester, N. Y.—A case (Stubbs v. City of Rochester, 124 N. E. 137) recently decided by the New York Court of Appeals involves the liability of a city to respond in damages for furnishing polluted drinking water which it was claimed caused typhoid fever. The city of Rochester has two systems of water supply, one for domestic use and the other for fire purposes and for sprinkling the streets. The potable water became contaminated and polluted by mixture with the other supply which came from the Genesee River. The plaintiff became ill of typhoid fever and sought to recover damages from the city, claiming that his illness was caused by drinking the polluted water and that the city had been negligent in allowing the water to become polluted. The evidence showed that there were many more cases of typhoid fever in the city during the period that the water was polluted, and that many persons who had drunk the polluted water had contracted typhoid. The health officer of the city gave it as his opinion that the plaintiff contracted the disease by drinking polluted water. It was shown that infection with typhoid fever can be acquired in several ways, and it was contended in behalf of the city that the plaintiff had not proved that the polluted water had caused his illness. The lower court dismissed the complaint on the ground that the evidence for the plaintiff was insufficient as a matter of law. The court of appeals, however, held that the facts should have been submitted to a jury, which would afford the plaintiff an opportunity to prove, if he could, that the infection was caused by the drinking water. A new trial was granted.

### Malaria Control Methods Successful.

New York, N. Y.—Results in controlling malaria in rural districts of the Southern states are recorded in the latest report of the Rockefeller Foundation. After telling of destroying the breeding places of mosquitoes and screening houses, immunizing the individual with quinine and sterilizing the blood of human carriers, the report reviews the initial experiment at Crosset, a lumber town of 2,129 in Ashley County, Arkansas. Climatic conditions and abundant breeding places favored the offending type of mosquitoes, malaria was widely epidemic and physicians of the regions estimated that it was the cause of 60 per cent of all illness. The program of eradicating breeding places was restricted to such measures as the community itself well might carry out, and was aimed at a reasonably high degree of control at minimum cost. The first conspicuous result apparent was the practical elimination of the mosquitoes as a pest, the report says. The reduction in malaria, as shown by a parasite index taken in May and again in December, 1916, was 72.33 per cent. Physicians' calls for the year were reduced 70.36 per cent, compared with the previous year. At the end of the year the community took over the work and carried it on for two years. This table shows the results:

PHYSICIANS' CALLS FOR MALARIA.

| | |
|---|---|
| Population | 2,129 |
| 1915 calls (company's records) | 2,500 |
| 1916 calls (company's records) | 741 |
| 1917 calls (company's records) | 200 |
| 1918 calls (company's records) | 73 |
| Reduction for the three years | 97.1% |

PER CAPITA COST.

| | |
|---|---|
| 1916 (omitting overhead) | $1.24 |
| 1917 (total cost) | .63 |
| 1918 (total cost) | .53 |

Operations then were transferred to the neighboring towns, the achievements being thus summarized:

PHYSICIANS' CALLS FOR MALARIA.

| | |
|---|---|
| Population | 1,285 |
| 1916 calls | 2,312 |
| 1917 calls | 259 |
| 1918 calls | 59 |
| Reduction 1916-1918 | 97.4% |

PER CAPITA COST.

| | |
|---|---|
| 1917 (omitting overhead) | $1.45 |
| 1918 (total upkeep) | .44 |

There followed experimental control in four Mississippi towns, the acheivements being thus summarized:

| | Lake Village. | Dermott. | Monticello. | Bauxite. |
|---|---|---|---|---|
| Population | 975 | 2,760 | 3,023 | 2,500 |
| Physicians call for malaria: | | | | |
| 1916 | 1,817 | 1,399 | 1,413 | 862 |
| 1917 | 1,388 | 1,248 | 1,274 | 729 |
| 1918 | 83 | 162 | 137 | 172 |
| Per cent reduction, 1917-1918 | 94.8 | 87.8 | 80.8 | 78.4 |
| Per capita cost, 1918 | $1.25 | $0.54 | $0.46 | $1.11 |

"Comparison of cost of operations with results accomplished in these six towns, tends to show that malaria control in such communities, considered merely as a business proposition, pays," the report continues. At two dollars per physician's call, Crosset has been paying annually more than four and one-half times as much in doctor's bills alone, for the privilege of having malaria, as it expended in 1918 for the upkeep of the work which kept it practically free from malaria and from the mosquito as a pest. Hamburg's annual doctors' bills for malaria had been eight times the cost of protection in 1918. In the four new communities, the annual payment for physicians' calls would cover even the relatively heavy cost of first year operations almost one-and-one-half times over. And the doctors' bill is but an insignificant fraction of malaria's total cost to the community.

Turning to a discussion of the work in rural districts where mosquito elimination is not practicable, the foundation reports on the first screening experiment on a group of cotton plantations near Lake Village, Ark. The people were taught the importance of maintainng the screens by house to house visits. Most of the population were negroes of average plantation intelligence, yet from the apparent average infection of 11.97 per cent at the beginning of the work, a parasite index at the end of the year showed a reduction of 70.6 per cent. The average annual per capta cost of screening was found to be $1.75. Similar results were attained on another plantation at a per capita cost of 57 cents.

Setting forth, that since all infected mosquitoes have derived their infection from the blood of infected persons, it is possible theoreticaly to prevent the spread of the infection in a community by destroying the parasites in the blood of the human carrier, the report tells of a two-year field experiment along this line in Bolivar County, Miss. A large number of blood examinations showed that persons who have had clinical attacks may carry the parasites in their blood for months, and demonstrated that the usual physician's treatment does not sterilize the blood.

These tests establish the fact that ten grains of quinine a day for eight weeks sterilized the blood of about 90 per cent of the carriers to whom it was administered.

## WATER SUPPLY

### Cleveland Loses Contract Bond Suit.

Cleveland, O.—The city loses $262,000 through the decision of the Ohio supreme court at Columbus in refusing to hear the case of the city against W. J. Gawns, contractor. Gawns had the contract for building a waterworks tunnel under Lake Erie but gave the job up after working on it for five years. The city was trying to collect the $262,000 from the Fidelity & Deposit Co. of Maryland, surety for Gawns.

### Virginia Cities Improving Water Supplies.

Richmond, Va.—According to figures prepared by the sanitary section of the state department of health, of which Major Richard Messer is chief engineer, 800,000 Virginians are drinking water, the sanitary condition of which has been improved by one or other of several ways during the nine years' existence of the department. During the year new filter plants were completed at Lynchburg, Alexandria, Langley Field, Camp Humphries and Quantico, while at Shenandoah, Franklin, and Fieldale filter plants are nearing completion. Additional filters were constructed at Suffolk. During the nine years, 30 new waterworks systems have been installed in communities having an aggregate population of 66,000 people; 25 new filter plants have been provided, serving a population of 125,000, and about 40 liquid chlorine plants have been installed improving the water supplies of populations aggregating 650,000. In this connection it is of interest to note that morbidity returns just completed for the year ending September 30, 1919, show a still further reduction in typhoid fever deaths. For the fiscal year just closed reported deaths from this disease numbered 2,221, the department's estimate for the state being 3,535. For the year ending September 30, 1918, reported typhoid numbered 2,374, and the estimated aggregate was 4,016. In the first fiscal year of the department, before the installation of improved water supplies in many towns and cities, estimated deaths from this one disease, in Virginia, numbered 14,398, or well above 1,000 a month.

## STREET LIGHTING AND POWER

### Orders Reduced Gas Price for Low Pressures.

Oklahoma City, Okla.—A supplemental order made by the Corporation Commission takes up the old "efficiency service" order of the commission on use of gas of several years ago, and makes it mandatory on the part of gas distributing companies to make deductions in gas bills to consumers. The previous order required gas companies to place pressure gauges on pipe lines, and any time these showed less than four ounces, the company was compelled to report such to the commission. In addition to this, the new order requires the gas companies to make deductions in gas bills, according to the pressure as actually shown. If the pressure is less than four ounces and more than three, the bill must be only 75 per cent. of the rate; if less than three and more than two ounces, 50 per cent. of the rate; if less than two and more than one ounce, 25 per cent. of the rate, and less than one ounce is considered no service at all. It is further ordered by the commission that no customer is to be discontinued if he refuses to pay a gas bill when presented, where there is a controversy. The "efficiency order" promulgated by the commission several years ago has been upheld by the Supreme Court.

### Big Interconnection Scheme for English Power Plants.

London, England.—Plans are in course of preparation for the erection of a new generating station on the banks of the river Trent, to supply an area of 2,000 square miles, 50 miles from north to south, and 40 miles from east to west. The area includes parts of Nottinghamshire, Derbyshire, Staffs, and Leicestershire. The first section of the station would cost £5,260,000, but supply authorities from Chesterfield to Leicester, on the one hand, and Burton-on-Trent to Newark on the other, would co-operate and bear a proportion of the cost. It is estimated that the whole scheme will require about £14,000,000 to carry through, but it means much cheaper power, and would result in a saving of £40,000 per annum to the Nottingham Tramways alone. At the station, which would occupy at least 100 acres of land, many advantages are offered—an ample supply of condensing water, facilities for bringing coal by water and rail, for the disposal of ashes and coal storage, and, what was very important in future, a carbonization plant. The capacity of the station would be 200,000 kw., and it would require 580,000 tons of coal per annum (or 1,500 tons daily) and 14,000,000 gallons of river water per hour. This scheme is at present under consideration by the engineers and representatives of the various authorities concerned, but progress cannot be made until the Electricity Supply Bill becomes law, when no doubt the schemes will be submitted to the government department concerned and to the authorities which will be set up for dealing with electricity supply generally.

## FIRE AND POLICE

### Two Platoon System Adopted.

Atlanta, Ga.—The city council has approved the plans to inaugurate a two-platoon system for the fire department and to pay to the widow of any fireman killed in the discharge of his duty his salary for one year. The ordinance will go into effect on January 1. The firemen presented a lengthy petition, asking that council take favorable action and a letter, approved unanimously by every member of the city fire fighters, as follows, in part: "We realize that the inauguration of the two-platoon system will increase the expenses of the fire department as much as the financial condition of the city will justify for the year of 1920. It is our earnest desire to be reasonable and fair in all our relations with the city and to show due appreciation for favors granted us. We, therefore, promise that we will make no request for an increase in salaries during the year 1920, if favorable action is taken by council upon our above petition. We recognize that the public character of our occupation, which is essential to the public welfare, imposes upon us a paramount duty of service to the public. We realize that a strike by the fire department, or by a union representing a large majority of the members of the fire department, would be inimical to the public welfare and contrary to the obligation which firemen owe to the public. For the foregoing reasons, we expressly disclaim and renounce any right to strike, either as a member of the fire department of the city of Augusta or as members of Firefighters Union No. 175." The only expense the adoption of the two-platoon system will mean will be the salaries of twelve additional firemen.

### Two Platoon System Defeated.

Newport, R. I.—At the recent elections held here the proposal to institute the two platoon system in the fire department was defeated. The vote was 405 in favor and 1,823 against.

### Special Food Stores and Hospital for Police Welfare.

New York, N. Y.—With the aid of a staff of prominent citizens who are interested in the welfare of the city, asking no compensation for their endeavors, special deputy police commissioner Julien Stevens Ulman is rapidly developing his plans for the Home Service Division of the Police Department. The first big undertaking is the opening of the community stores, which it is believed will result in the greatest solution for the reduction of the high cost of living yet hit upon. With half a dozen of these stores already in operation in Brooklyn and as many more soon to open in Manhattan, the problems of policemen and their families will be greatly lessened. Henry F. S. Williams has been appointed honorary deputy chief of police and will have direct charge of the chain of police department stores. About 75,000 people will benefit by the efforts of Commissioner Ulman and his aids, for they mean not only to reach the members of the active police force and their dependents, but those on the pension list of the Police Department and also the widows of policemen will be able to enjoy the advantages of the stores. At present the stock in the stores will be limited to food commodities. The articles are being sold at cost plus 5 per cent for overhead expense. This small overhead expense is made possible by having the stores in the police stations. The reservation of space in the station is also advisable because of the great convenience to the policemen, for they can shop for their family at some hour in the day without journeying to a distant point. The purchases can also be made by members of the families, for cards are to be issued, and, with the proper identification, will be honored.

"The Home Service Division will not stop at selling the necessities of life to the men," said Commissioner Ulman, in discussing his plans. "It will broaden out as we progress, and that will be very rapidly, I am sure, for I have been very fortunate in enlisting the aid of such able men. We hope very soon to be able to help a member of the department with advice and material aid, no matter what his needs may be. If he needs financial help, he will be able to come to us, and a confidential arrangement will be made with him which will tide him over his difficulty. In the near future we expect to build a hospital, where the members of the department and their families may go for medical treatment.

"While our program is still very much in the making so far as visible results are concerned, I believe we have given the first great incentive for the working out of the serious problems confronting the people of this country on the necessary commodities of life. There is no doubt that these humanitarian formations to reduce the cost of living will become more general throughout the United States within a short time.

"We are very gratified at being able to so cut the current prices at the stores. We find in some cases that we are able to sell at as much as 50 per cent less than the average store. By using the stations the overhead expense will be eliminated and the slight advance over cost will just pay the expenses absolutely necessary. Since the average overhead expense of the chain stores about the city is 38 per cent., the saving we will be able to effect will be considerable.

"It is simply this, that with our stores in operation the value of the policeman's dollar will rise to $1.50, and although the salary of the New York policeman is $1,900 or $2,000, the value of that amount will be equal to $3,000, which will make the New York City Police Department the highest paid department in the world.

"Of course, we must have it perfectly understood that buying for outsiders is taboo. Any man found doing this will be blacklisted and he will be unable again to make a purchase.

"According to an arrangement which we have completed with a large manufacturer of shoes, it will be possible for the Home Service Division to sell a specially made shoe which has been designed for policemen and if bought in an outside store would cost more than $20. The police store will have these shoes on sale within a short time at something like $8. We decided upon these shoes because so many of the policemen suffer from foot trouble.

"Another arrangement has been made to sell uniforms to the men. In a very short time we will have our own tailoring department, and the cloth with which to make the uniforms will be purchased directly from the producer, which will mean a great saving to the men. The men of the department have been listening to promises for some time, but now things are going to happen."

Mr. Ulman is a member of the New York Stock Exchange. At the time of his appointment recently he described a project for the establishment of a $5,000,000 hospital for the benefit of the policemen and their families. The hospital, Mr. Ulman said, was to be started at once. The wealthy special deputy police commissioners have announced their intention to subscribe to the fund, which will require $2,000,000 for the building and $3,000,000 for maintenance. Mr. Ulman said that ex-President Taft had consented to act as honorary chairman of the Police Hospital Board.

## GOVERNMENT AND FINANCE

### Mayor of Canton Removed by Governor.

Canton, O.—Charles E. Poorman has been ordered permanently removed as chief executive of the city. The order of removal was issued by Governor Cox after a hearing before the governor which resulted in mayor Poorman being convicted of gross neglect of duty through failure to properly maintain order during the steel strike here during September and October. Henry A. Schrantz, serving as mayor since the suspension of Poorman by Governor Cox on October 27, will continue to handle the reins of the city government until mayor-elect Herman R. Witter takes office January 1. Poorman expects to appeal the action of the governor to the courts. The appeal will be made on error, according to attorney Sweitzer, counsel for Poorman. The governor's order of removal marks the end of a turbulent term of less than two years as mayor for Poorman. Frequent clashes with council, his unsuccessful attempt to oust Charles N. Riblet as police chief, defeat by his party for renomination, the steel strike and its attendant disorder, and the final climax of suspension and removal by Governor Cox, were the high spots in the Poorman administration. Poorman had previously spent eight quiet and peaceful years as treasurer of Canton. The action of Governor Cox in following up his suspension of Poorman by an order of removal did not come as a surprise to Poorman or those present at the hearing in the governor's office. Poorman said chief Riblet had not been as active in preserving order as he might have been. Poorman said there had been no disorder in Canton since October 24, three days before he was suspended by the governor. Affidavits were presented from chief of police Riblet, Ellis Darany, sergeant of police; S. A. Lengel, lieutenant of police, and Robert F. Patterson, captain of police, in support of the mayor's contention that there had been no disorder since October 24. The policemen blamed private police for the trouble. Letters were also presented from prominent citizens, including steel company officials, asking Poorman's reinstatement. The governor made the following statement after announcing the removal of Poorman: "In times such as these, no temporizing policy can be countenanced and I feel that restoration to office might be accepted throughout the state as a relaxation of that order of vigilance that must continue. The laws must be enforced and no compromise must be made with that fixed policy. Because of this, suspension was followed by removal from office. There has been nothing in the inquiry to indicate that mayor Poorman deliberately neglected his duty, but the element of neglect was present in such measure as to render state action necessary to the public interest. Cordial relations were not existent between the mayor, the chief of police and the city council, and this circumstance seemed to have developed a sort of do nothing policy, the mayor seeming to believe that it was quite useless for him to make any attempt. In short, he did not exercise his leadership in an emergency which the community was entitled to, and seemingly possessed no conception of the power inherent in his office. As a result, a crisis developed, and the head of the municipal government did not render a proper accounting to it. It was stated in the hearing, and not denied, that conditions now are normal, but because of this appeal was made for the reinstatement of the mayor." The six charges against Poorman were said to be as follows:

1—Failure on the part of the said mayor to supervise generally the department and offices of the corporation as authorized and required by sections 4262 and 4263 of the general code, and particularly in not exercising a supervision over and requiring a strict performance of the duties of the police department of said city.

2—In permitting the peace, quietness and good order of the city to be disturbed by mobs and rioters without taking the necessary and proper steps to prevent the same.

3—In permitting citizens of said city of Canton, and particularly men who desired to work in the various manufacturing plants, to be assaulted by rioters and strikers without exhausting the powers conferred on him by law to protect the same.

4—In not taking full advantage of and exhausting the power conferred on him by section 4373 to appoint additional patrolmen and officers for temporary service during the existence of the emergency created by said riotous gatherings and other conditions arising out of the strike situation in said city.

5—In not properly protecting the property of citizens of said city of Canton in that street cars operating in said city of Canton were allowed and permitted to be stoned and damaged.

6—In not properly performing the duties of chief conservator of the peace within the corporation as prescribed by section 4250 of the general code.

### City Manager Appointed.

West Palm Beach, Fla.—Joseph Firth has assumed office as city manager, having resigned from the position of commissioner of public works of Winston-Salem, N. C., to come here. He came to Winston-Salem from Charlotte, first as city engineer, being appointed commissioner of public works upon the re-organization of the city government under a revised charter. His work in Winston-Salem has been highly commended, water and sewer facilities having been extended throughout the city; streets connected up and put in passable condition, miles of streets having been put to permanent grade and many miles of street paved; concrete sidewalks have been laid all over the city; the city water system has been practically reconstructed. Plans for a dam on the water shed, which will hold in reserve 60 to 90 days reserve, will soon be ready to turn over to the city. Under his direction the department has been kept well in advance of the growing needs of the city. Mr. Firth will be succeeded in Winston-Salem by capt. Harry L. Shaner, former city manager at Lynchburg, Va., but who has been engaged in government work since he entered the services of the war department at the bginning of the war. Capt. Shaner will be assisted by W. F. B. Halensworth, of Greenville, S. C.

## STREET CLEANING AND REFUSE DISPOSAL

### Hog-Feeding Contract Abandoned.

Davenport, Ia.—It is costing the city $10,000 a year at present because the citizens would not refrain from throwing broken bottles, safety razor blades, and such rubbish into their garbage cans. Davenport for years has provided free garbage collection at a cost of over $20,000, before the recent annexations to the city. Something over a year ago a company offered to collect the garbage and feed it to hogs for $12,500 a year, if the city would adopt ordinances making it the exclusive general collector, and providing that no one should mix ashes, tin cans, and other rubbish with the garbage. After extended negotiations the contract was closed, and the hog farm started west of the city, an improvement over dumping the collections on the levee or the older method of throwing them into the river where they affected Muscatine water supply. Soon after the farm began operation hogs died—six in one day because of glass or safety razor blades. As a result the company threw up its contract, and the city has since been collecting the garbage at an increased expense of $1,000 a month. The annual cost of collecting garbage efficiently in the greater Davenport since outlying territory was annexed is likely to run nearer to $30,000 than $20,000.

### Car Companies Must Pay for Street Sprinkling.

Sacramento, Cal.—A report received here from Washington states that the United States Supreme Court has upheld the validity of an ordinance passed here June 19, 1913, requiring the street car companies to sprinkle their tracks, and within a reasonable distance on each side in order to lay the dust while the cars are in operation. This decision ends a long battle fought by the Pacific Gas and Electric Company. The city of Sacramento won in the police, superior, appellate and state supreme courts, and finally in the highest tribunal in the land. Commissioner of streets, D. W. Carmichael, expects the Pacific Gas and Electric Company will at once pay to the city the money that is due. The damages alone amounted to about $30,000 in 1915, and Carmichael stated it will be a great deal more now. These damages have accrued by the terms of the ordinance which stated that for every day's violation the sum of $2 per mile of unsprinkled track will be paid to the city. In addition to the damages, the company will be required to pay the $400 fine which was assessed upon it in the police court. It was from the ruling of the police court that the appeal was taken. The ordinance in question was introduced by commissioner Charles Bliss at a time when the cars were operating over a very large mileage of unimproved streets. The company was willing to sprinkle that section of the street between the tracks, but refused to sprinkle on each side of the tracks for a sufficient distance to settle the dust. During the six years which this suit has been pending the city has been sprinkling the disputed area in the sections where the streets are unimproved.

### City Not Restrained from Feeding Garbage to Pigs.

Baltimore, Md.—The court of appeals of Maryland has refused to restrain the city of Baltimore from disposing of garbage on a farm owned by the city and situated outside of Baltimore. (Mayor and City Council of Baltimore et al v. Sackett et al, 107 Atl., 557.) A temporary reduction plant to dispose of the garbage was to be erected by the city, and later a permanent piggery was to be established and the garbage fed to some 15,000 pigs to be kept thereon. Adjoining property owners brought suit, contending that this would result in a nuisance and destroy the value of their property. The court of appeals decided in favor of the city and refused to issue an injunction, holding that sufficient facts had not been stated to satisfy the court that the apprehension was well founded so as to justify the court's interference.

## TRAFFIC AND TRANSPORTATION

### Cars Resume Operation in Toledo.

Toledo, O.—After nearly a month without street car service, the city is again enjoying its electric railway system, an agreement having been finally arrived at between the factions which caused the trouble. Service was resumed at the rate of fare prevailing before the cars were taken over the state line to Michigan—six cents with two cents for transfer. Under the terms of the settlement the city and company must agree on a franchise draft by Jan. 15 or service may again be suspended after ten days. A special election is to be held on this franchise, and on a municipal ownership proposition if the city wishes, by Feb. 17, or else the company may again withdraw service. Federal Judge Killits has appointed a commission consisting of two divisions to assist city officials in drafting both the "Tayler plan" and municipal ownership ordinances. The company's requests, granted by the court, and inserted in the formal order for resumption of operation, provide:

> City and Rail-Light negotiators must agree upon the draft of a service-at-cost-plus franchise ordinance not later than Jan. 15, 1920. If no such agreement has then been reached, the company can discontinue service 10 days thereafter.
>
> A special election on the granting of the franchise ordinance must be held not later than Feb. 17. If no such election is called by council, the company can discontinue service and remove its ars and equipment within 10 days.
>
> The fare rate is to be six cents, with two cents for a transfer—the same rate which prevailed before the cars were taken to Michigan—but the company is granted the right to appeal to the court for revision of fares. There can be no arbitratory raises, such as that which precipitated the passing of the ouster ordinance by council last June.
>
> The company reserves the right to rearrange its schedules to meet motor bus competition, if it continues.
>
> The company reserves the right to apply to the court for permission to discontinue service if the city, in its dealings, seeks to impose unfair or confiscatory burdens upon the company.
>
> The company disclaims, specifically, its recognition as legal, either of the original ouster ordinance or the Duffey amendment.

Although the court order makes no reference to the possible or probable submission to the voters of a municipal ownership ordinance, Judge Killits, Mayor Schreiber and company representatives agree that this is to be done. The city council had previously voted to "amend" the ordinance which originally ousted the car company providing for a return of service at the six cent fare, with two cents for transfer.

### "Service-at-Cost" Franchise Defeated.

Minneapolis, Minn.—The proposed "cost of service" franchise giving the city control of street car service was defeated at the special election recently. The majority against was nearly 7,000.

### Massachusetts to Buy Transit Tunnel.

Boston, Mass.—The state house of representatives has passed a bill providing for the purchase by the state of the Cambridge subway. The bill provides that the state shall pay to the "Elevated" not more than $8,000,000 for the property, and lease it to the company for a rental equivalent to 4½ per cent. on the bonds to be issued by the State on account of the purchase price. This $8,000,000 is to be used by the "Elevated" for the purchase of new rolling stock and other equipment, which, according to the trustees, could not otherwise be obtained. The "Elevated," in addition to this new capital, will benefit by the difference between the comparatively low rate of interest it will pay as rental and the high rate which it would be obliged to pay on such bonds or stocks it might later be able to issue to obtain the $8,000,000 new capital necessary to maintain its property.

### First Zone Fare Plan in California.

San Diego, Cal.—Authorization of a zone system of fares for the electric street railways of San Diego has been decided on by the State Railroad Commission, the decision being the first on record in which the one-fare system for street railways have been departed from in California. The decision lays down several new precedents for the operation of street car lines in the state. The opinion was written by Commissioner Frank R. Devlin, following an examination by himself and commission engineers into the affairs of the San Diego Electric Railway Company and Point Loma Company, which had applied for relief from financial troubles through higher fares and permission to abandon specified lines. The decision authorizes an inner, or short-haul zone in which fares shall be 5 cents and an outer, or long-haul, zone, fares to be 10 cents. Interurban fares are readjusted. Ticket books—four tickets at 7½ cents and sixty-ride books at 6½ cents—are ordered. Application of the street railway company to discontinue lines in East San Diego and Point Loma is denied, and radical changes in paving laws are recommended to the San

Diego municipal government to obviate the necessity for expensive types of paving work by the street car company. The decision is based on investigations extending over a year's time, following the company's appeal for higher fares. Devlin's report says that the zone fare system is estimated to give the company sufficient income, even taking into consideration a possible dropping off of traffic under the higher rates. The company is ordered to set aside a depreciation fund of $18,000 a month out of its increased income.

### City Told to Take Over Street Car Lines.

Walla Walla, Wash.—The state public service commission, after an informal hearing which lasted two days, has recommended that the city lease the street car lines of the Walla Walla Street Railway company and run them until such time as a final solution of the problem of keeping the cars in operation could be decided upon. The annual deficit at present is about $12,000, and it is thought that with municipal ownership and physical connection with the O.-W. R. R. & N. railway, that freight and other earnings can be materially increased. It is understood that the city commissioners have power to lease the lines and operate them without change in the city charter.

## MISCELLANEOUS

### City Planning Expert Appointed.

Spokane, Wash.—Agreement to employ a city planning expert for this city at a salary of $3,600 a year has been reached by the city plan commission. C. S. Cheney of San Francisco, city plan consultant for Portland for the last two years, has been agreed upon

### Ordinance to Prevent Rent Profiteering.

New York, N. Y.—An ordinance which, says the chairman of the Mayor's Committee on Rent Profiteering, will be effective in breaking up the "rings of lessees who have conspired to bleed tenants already paying abnormal rents" has been passed by the board of aldermen. The new measure provides for the licensing of all lessees. The Mayor's Committee believes the lessees are responsible for a large part of the profiteering in rents, the favorite being to lease and sublease and resublease among the various members of a family, each new transaction being accompanied by another rise in rent. The ordinance, stripped of its technical provisions, is as follows:

> A person, corporation, or partnership who or which leases a tenement in the City of New York having three or more dwelling apartments and subleases any portion or part of the said tenement to three or more persons shall be deemed to be a lessee of tenements intended within the terms of this ordinance.
>
> The Commissioner of Licenses, with the approval of the Tenement House Commissioner of the City of New York, shall license, in his discretion, such lessees of tenements as shall have complied with the rules and regulations laid down by the Board of Aldermen, and, further, any such rules and regulations to be subject at all times to amendment by the Board of Aldermen. The annual license fee for such tenement leases shall be $25, and $10 additional for each additional tenement the said lessee may lease.
>
> Each tenement lessee in the City of New York shall on or before Jan. 1 of each year procure a license in accordance with the provisions heretofore stated.
>
> The Commissioner of Licenses, after hearing, shall have power to suspend or revoke at any time any license granted in accordance with this article. Any person, firm or corporation whose license has been revoked shall be ineligible to procure a new license for at least three years from the date of the revocation of said license by the Commissioner.

The purpose and effect of the measure, as explained by chairman Hirsch, is as follows: "It has a two-fold purpose. First, it will enable those who are affected by the gouging of rent profiteers to determine who is the owner of the property and how often the leased premises have been transferred with the sole purpose each time of bleeding the tenants after they have already been bled white. In the second place, it will act as a deterrent to the leasing of premises among relations or friends when such transfer has behind it no other intent than to provide an excuse for the raising of the rent. With the help of the new ordinance we shall be able to establish a conspiracy among relatives and friends, and will prevent such conspiracies from being entered into. Heretofore, while it has been necessary to record actual transfers of property, the recording of a lease has been optional with the lessee, and it is from the lessees or the leasters, as the tenants call them. that we have had the most trouble."

## LEGAL NOTES

### A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

### State and City Regulation of Automobiles.

(Cal.) Motor Vehicle Act 1913, requiring automobile drivers when passing street cars in a city to operate the automobile with due care and caution to prevent injury to those boarding or alighting from the car, and a city ordinance requiring an automobile driver to stop 10 feet behind a car standing still to allow passengers to board or alight, are not inconsistent.—Mann v. Scott, 182 p. 281.

Where the Legislature has assumed to regulate a given course of conduct by prohibitory enactments, a municipality with subordinate power to act in the matter may make such new and additional regulations in aid and furtherance of the purpose of the general law as may seem fit and appropriate to the necessities of the particular locality, and which are not in themselves unreasonable.—Id.

### County Road in City Limits—City Without Control.

(Or.) Although a county road may traverse land within the limits of an incorporated city or town, yet, unless the state through its legislative department, or the county as the agent of the state, employing procedure prescribed by statute, surrenders authority over the road, the city cannot assume control.—Cole v. City of Seaside, 182 p. 165.

The mere fact that the county road is embraced within the boundaries of a recently created municipality does not ipso facto make it a city street.—Id.

### Damage to Bull Falling Into Sewer Excavation—Negligence of City.

(Iowa). Where plaintiff's bull, which was being driven along the street of a municipality, stepped on a scraper and fell into an excavation for a sewer which had been left open and unguarded, held, that the negligence of the municipality was the proximate cause of the injury.—Johnson v. City of Denison, 173 N. W. 46.

(Iowa.) Where there was testimony that plaintiff's bull was proceeding leisurely along the street in a quiet and orderly manner when he fell into an open excavation, plaintiff cannot be deemed guilty of contributory negligence under Code, § 2314, declaring that stock shall not be considered as running at large so long as it is under the immediate care and efficient control of the owner upon public roads for travel; but the question was for the jury.—Id.

### Power of City to Regulate Business—Size of Restaurant Booths.

(Utah.) An ordinance regulating a business must be reasonable, and its provisions cannot be oppressive nor an arbitrary interference with the business or calling which is regulated.—Ogden City v. Leo. 182 p. 530.

The power of a city to "regulate" a particular calling or business as conferred by statute (Comp. Laws 1917, § 570x 38) implies the right to prescribe and enforce all such proper and reasonable rules and regulations as may be deemed necessary and wholesome in conducting such business in a proper and orderly manner.—Id.

Where there is nothing on the face of an ordinance regulating the size of booths in restaurants to show it is unreasonable, that it is unwarranted interference with a proper business, or that the conditions in the city are not such as to require regulation, it will be presumed that the city authorities were warranted in passing the ordinance.—Id.

# NEWS OF THE SOCIETIES

**Feb. 9-13, 1920.**—AMERICAN ROAD BUILDERS' ASSOCIATION. Annual convention, Louisville, Ky. Secretary, E. L. Powers, 150 Nassau street, New York.

**May 18-21, 1920.**—NATIONAL ELECTRIC LIGHT ASSOCIATION. Annual convention, Pasadena, Cal. Acting secretary, S. A. Sewall, 29 West 39th street, New York City.

**June 21-25, 1920.**—AMERICAN WATER WORKS ASSOCIATION. Annual meeting, Montreal, Canada. Secretary, John M. Diven, 153 West 71 street, New York City.

**Jan. 14, 1920.** — NEW ENGLAND WATER WORKS ASSOCIATION. Annual meeting, Hotel Brunswick, Boston, Mass. Secretary, Willard Kent, Narragansett Pier, R. I.

**Jan. 19, 1920.**—AMERICAN INSTITUTE OF CONSULTING ENGINEERS. Annual meeting, New York City. Secretary, F. A. Molitor, 35 Nassau street, New York City.

## National Highway Traffic Association.

The annual convention of the National Highway Traffic Association wil be held in the International Amphitheatre, Chicago, on Thursday, January 29. The following program will be presented at the morning session. Arthur H. Blanchard, president, National Highway Traffic Association, acting as chairman:

Report of committee on "Highway Transport Franchises," chairman, F. W. Fenn, secretary, Motor Truck Committee, National Automobile Chamber of Commerce.

Report of committee on "Inter-relationship of Highway, Railway and Waterway Transport," chairman, Professor Henry E. Riggs, University of Michigan.

"Effect of Car Tracks on Traffic Capacity of Roadways" by George W. Tillson, consulting engineer, La Grange, Ill.

Report of committee on "Traffic Limitation Strips on Roadway Surfaces," chairman, C. W. Hubbell, city engineer, Detroit, Mich.

Report of committee on "Sign Posting for Detours, and Through Routes in Municipalities," chairman, Elmer Thompson, secretary, Automobile Club of America.

On Thursday afternoon, at 2:30 p. m., will be held a joint session of Highway Transport Conference of the National Highway Traffic Association, on the subject of "Highways and Motor Transport." The chairman of session wil be Arthur H. Blanchard, president. The following papers will be presented:

"Taking an Interest in Motor Truck Legislation by Harry Meixwell, Jr., secretary, Automotive Industries Legislative Commission, New York.

"Value of Highway Transport Surveys," by F. Van Z. Lane, transportation engineer, Packard Motor Car Company.

"Inter-relationship Between Highway Transport and Back-to-the-Farm Movement," by R. C. Hargreaves, manager Detroit branch, B. F. Goodrich Rubber Company.

Another joint session will be held in the evening, the subject being "Highways and Motor Transport." The chairman of the session will be R. C. Hargreaves, vice-president, North Central Division, National Highway Traffic Association. The following papers will be read:

"Relation of Highways to Motor Truck Operating Cost," by Arthur H. Blanchard, Professor in Charge of Highway Engineering and Highway Transport, University of Michigan.

"Progress in Highway Improvement," by William G. Edens, president, Illinois Highway Improvement Association.

"Constructing Roads for Motor Truck Traffic," by T. R. Agg, Professor of Highway Engineering, Iowa State College.

"Status of Legislation Relative to Snow Removal from Inter and Intrastate Highways," by Raymond Beck, chief, Goodrich National Touring Bureau.

## The Associated General Contractors of America.

Secretary G. W. Buchholz of the Associated General Contractors of America has sent the following letter to associations of manufacturers of construction equipment and materials protesting against the practice of supplying engineers and contractors with detailed estimates of costs:

"You are anxious to push highway construction, of course; the more miles of road let at fair prices next year, the better pleased you will be. For this reason, if for no other, I am sure I can count on your aid in removing one big hindrance to placing large quantities of work under contract, and upon your assistance in attracting high grade contractors to highway work.

"Our members who build roads in a big way tell us that they are handicapped in securing profitable work—and others who might enter the highway field stay out—because of the low estimates that frequently have limited the prices at which contracts could be awarded, and because of the precedents established by ill-advised bidders.

"These highway contractors feel that the low cost figures spread abroad by various machinery manufacturers are to a large degree responsible for many of these low estimates, particularly when costs based on an exceptional performance are incorporated into a detailed estimate for another very dissimilar job, and overhead and contingencies are not properly cared for. We realize that no intentional misrepresentations are made, but figures that cause a lot of trouble are sometimes given to an inexperienced engineer or contractor who has not the judgment to use them properly.

"In our opinion, equipment and material representatives should refrain entirely from supplying an engineer or contractor with detailed estimates of cost. Perhaps he isn't as competent as your man to determine the theoretical cost of mixing and placing concrete or the proper allowance for overhead, but experience is a good teacher and the best cure for incompetency.

"Certainly if the estimate is too low, tell him what other similar work has gone for. Tell him about your equipment and what you think it will do—then let him reduce the data to his conditions.

"Naturally you will work enthusiastically for your own interests—everyone expects it and the work you are doing for a big good roads program is much appreciated. But we request that you do not endanger our interests by invading the field of the engineer or the contractor.

"We hope for you cooperation in this matter, both as regards your own men, and in urging the same policy upon other manufacturers. We should be glad to receive your opinions for publication."

A member of the A. G. C. recently sent the following letcr to an equipment manufacturer:

"We have your recent letter requesting a statement of costs of hauling with your wagons.

"We have a very strong prejudice against manufacturers publishing so-called 'costs' of handling material with their equipment, and in particular the preparation of detailed estimates, and you will note at the present time there is agitation by the Associated General Contractors to endeavor to persuade firms to stop this practice, as it has a tendency to encourage people to enter the contracting business that have a few dollars but little sense.

"Daily costs are kept on our work, and we could send you a very beautiful statement, which would be based upon facts, but there are no two days alike and in order to get a statement of any value you would have to take an average over a period of months. Take for instance your statement of costs in your folder. You show a yard mile cost of 23.4 cents. If this could be done all the road contractors in this country would be immensely wealthy instead of nearly all of them being 'broke.' Your loading cost of 15 cents a yard would be a joke if it wasn't serious.

"Your wagons are proving entirely satisfactory so far as we have used them. But there is one thing further we would like to call your attention to, and that is your referring to your wagons as 3½-yard. This is a hindrance to contractors, as the wagons, loaded the way we load them, hold four yards, and we expect an estimate on that basis. An engineer sees your catalog showing only 3½ yards and an argument is started. We do not want you to feel that we are selfish in this business, but we perhaps are one of the oldest in the game and we have seen a great many rise and fall through ignorance of actual conditions."

## American Association of Engineers.

The latest member obtained by the American Association of Engineers in its campaign for 10,000 new members during the first two weeks in December is Major General Leonard Wood, commanding general of the Central Department of the United States Army.

General Wood's application was passed by the national qualifications committee of the Association on account of the engineering experience obtained by General Wood while he was military governor of Mindanao and because of the high order of sanitary engineering talent displayed by him while acting in that capacity. General Wood was in charge of the construction of highways, harbor improvements, railroads, schools, water purification works, and sewerage systems.

General Wood is the ten-thousandth member of the American Association of Engineers. A year ago the membership was only 2,300 and this increase to 10,000 is irrespective of the members gained during the drive throughout the United States from December 1 to 13.

Board bill No. 56 providing for increased compensation for profesional

(*Continued on page 360*)

# NEW APPLIANCES

**Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.**

## ROTARY PUMP.

### For Attachment to Ford Chassis for Fire-Fighting and Other Purposes.

A small rotary pump which can easily and quickly be mounted on a Ford touring car chassis has been designed to bring a motor-driven pumping engine within reach of even the smallest communities. The pump is so compact and so efficient for its size as to make it a versatile piece of equipment, suitable for pumping water from ditches during construction work, for pumping out manholes, flushing out sewers, spraying trees, etc., as well as for fire-fighting.

The pump is of the rotary type with phosphor bronze rotors, alloy steel shafts, annular ball bearings, patented bronze stuffing boxes.

The drive unit consists of an oil-tight case carrying nickel steel hardened gears on annular ball bearings. The sliding gear is operated by a lever, which is on the outside of case convenient to the driver. This drive unit case is bolted to the pump head in such a manner that it is practically part of the pump.

Each pump is equipped with two suction hose and two discharge hose connections, one of each on each side of car. The discharge connections are fitted with shut-off valves, while the suction connections are supplied with removable brass caps. There is a bypass (hand operated) between the discharge and the suction tubes of the pump.

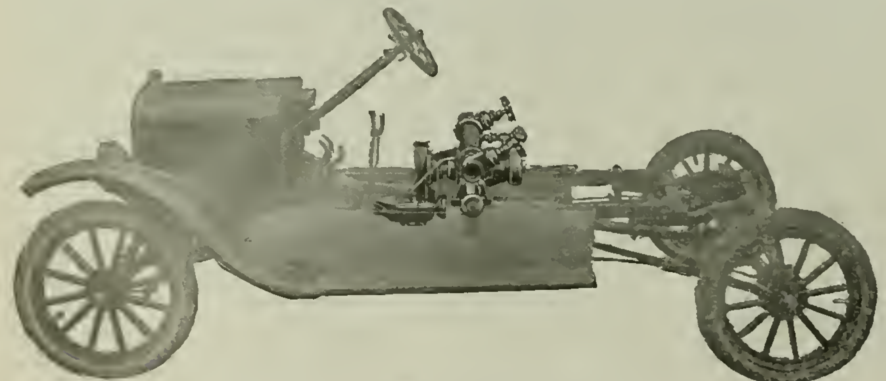
A pressure gauge is supplied with each pump, together with the necessary tubing and fittings. Suction hose and strainer are supplied if ordered. Strainers are of heavy brass, perforated.

In mounting, the drive shaft and housing are detached, the pump is placed in position on the frame and the front end of the drive unit bolted to the rear of the transmission housing. The propeller shaft is connected to the rear end of the drive unit. A one-quarter inch copper tube is run from a fitting which is on the pump to the cylinder block of the motor.

A gear shift lever is attached to the drive unit, permitting the operator to disengage drive shaft of car and engage the pump by throwing out the clutch and moving the lever forward or backward.

Any man who can satisfactorily operate a Ford car can handle this pumping engine without difficulty and obtain results at a fire or in any other service possible.

The pump, shown in the accompanying illustration, is made by the Hale Fire Pump Co., Inc.



HALE ROTARY PUMP, ATTACHED IN PLACE.

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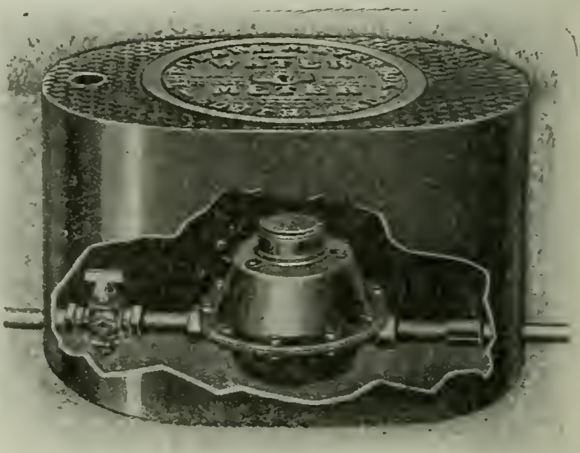
## CLARK METER BOX.

### With New Combination Feature.

The "No. 11 Oval Southland" Clark meter box has a number of interesting features which are in many ways a departure from ordinary practice in meter box construction. These are calculated to result in a saving in installation, maintenance and reading.

An unusual combination feature is the housing of the curb cock in the same box with the water meter, in this way eliminating the use and expense of the separate curb cock and thus making a substantial saving.



NO. 11 OVAL "SOUTHLAND" CLARK METER BOX.

While the box offers the plumber quick and convenient access to the curb cock, the meter can be reached only with the use of the key required to operate the "Wonder" lock of the box lid.

This meter box is so constructed that it can be readily removed from the concrete walk or pavement without in any way damaging or defacing the concrete. This is of particular advantage because leaks located back under the walk or pavement may be repaired working from the box. The box is removed by unlocking the lid and lifting the box straight up and the necessary tunneling may be done for several feet on either side—the box then being replaced through the original opening for its setting.

The box presents a neat appearance in the lawn or sidewalk and is safe to pedestrians while it assures meter protection. It is furnished in cast iron and sheet iron, black and galvanized. The accompanying illustration shows a cast iron box with a part cut away to show the interior features.

This box is made by H. W. Clark Company, Mattoon, Ill.

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# INDUSTRIAL NEWS

### Important Consolidation in Construction Materials and Equipment Field.

The firms of Waldo Brothers, Inc., dealers in building materials, and Harold L. Bond Co., dealers in construction equipment, have been consolidated into a new firm, Waldo Bros.

and Bond Company, effective Jan. 1, 1920.

The board of directors of the new firm will be as follows: Harold L. Bond, president; C. Sidney Waldo, first vice-president; Llewellyn Howland, vice-president; Harold C. Bond, secretary; Frederic W. Mattheis, sales manager; James G. Lincoln, treasurer; Roger Ernst and Frank M. Bates. The offices and salesroom will be at 181 Congress street, Boston, Mass., and it is expected that the consolidation will afford a complete service to the contracting and building industry of New England.

### Highway Transportation Conferences at Automobile Shows.

All truck owners are invited to attend the highway transportation conferences to be held in connection with the New York Automobile Show, January 3-10 and the Chicago Automobile Show, January 24-31.

Twice daily for an hour and a quarter, with the exception of the opening and closing day at the New York and Chicago shows there will be discussion of every type of truck problem. The sessions afternoons and evenings will be devoted to different phases of transportation appealing to different types of users of trucks, but all sessions will be open to all who wish to come.

A feature of the conference sessions will be the liberal use of illustrations, both steropticon slides and motion picture films. An added feature will be motion picture shows, lasting one-half hour or more, and following the sessions, each afternoon and evening. For these "movies" a large number of films, dealing with motor transportation in all of its varied phases, are being collected. Several are being secured from abroad. Dr. Francis Holley, Director of the Bureau of Commercial Economics at Washington, is co-operating in collecting interesting films having to do with highway transportation by motor vehicles.

The conference will open on the evening of Jan. 3 in New York and the evening of Jan. 24 in Chicago, with important inaugural sessions. Invitations to speak at these inaugural sessions have been extended to members of the President's cabinent, United States senators and governors of different states, and already several have accepted.

There is a general title for each session and two or three sub-divisions, each with its own subjects.

The following will be the subjects discussed at the afternoon sessions, the earlier date referring to New York and the later to Chicago:

**Jan. 5, Jan. 26.**

Merchandising Motor Trucks.
Effective Advertising.
The Trade Segregation Plan.
The Farm Field.

**Jan. 6.**

Smoothing the Path of the Motor Truck.
Working for Highway Improvement.
Taking an Interest in Legislation.
The Automobile Legislative Council.

**Jan. 7, Jan. 28.**

Selling on the Firing Line.
Proven Sales Plans.
Developing Prospects.
Promoting Rural Motor Express and Other Enterprises.

**Jan. 8, Jan. 30.**

In the Matter of Service.
The Truck Owner's Viewpoint.
The Truck Dealer's Plan.
The Manufacturer's Policy.

**Jan. 9, Jan. 27.**

Selling Motor Transportation.
Handling Motor Trucks and Passenger Cars Together.
Offering a Complete Transportation Line.

**Jan. 29.**

(This session is under the direction of the National Highways Traffic Association.)
Promotion of Highways and Traffic.
Taking an Interest in Legislation.

The following will be the subjects of the evening sessions:

**Jan. 5.**

Motor Vehicles in Passenger Transportation.
Replacing Street Cars with Motor Buses.
Motorbus Operation.

**Jan. 6, Jan. 30.**

Increasing Motor Haulage Efficiency.
Cost Accounting, Routing and Dispatching.
Loading and Unloading Devices.
Incentive for Drivers and Helpers.

**Jan. 7, Jan. 28.**

Rural Motor Express.
Its Opportunities as an Investment and Business Career.
Its Advantages to the Shipper.
Its Benefits to the Producer and Consumer.

**Jan. 8, Jan. 31.**

Aids to Motor Truck Efficiency.
Trailers.
Pneumatic Tires.

**Jan. 9, Jan. 26.**

Motor Truck and Railroad Freighting.
Cost, Range and Service Comparisons.
Connecting Farms and Markets.

**Jan. 10, Jan. 29.**

Highways and Motor Transport.
Relation of Roads to Operating Cost.
Progress in Highway Improvement.
Constructing Roads for Motor Truck Traffic.

**Jan. 27.**

The Farmers' Haulage Problems.
The Horseless Farm.
Connecting Farms and Market.
Farm Power.

### Plan Municipal Equipment Exposition in Europe.

Mrs. Jeanne Carpenter, until recently director of the projected International Exposition of Municipal Equipment, now plans to work out a somewhat similar exposition in Europe. This new plan has no connection whatever with the other or with the Merchants and Manufacturers Exchange of New York. Associated with Mrs. Carpenter will be E. J. Dewine, who was also connected with the abandoned exhibition in Grand Central Palace.

### Prominent Engineers Inspect Concrete Culvert Pipe Tests.

An inspection trip was recently made by prominent railway and highway engineers to Ames, Iowa, to witness experiments being made by the Experiment Station of Iowa State College, in conjunction with the Iowa State Highway Commission. Experiments cover tests on reinforced concrete culvert pipe, special concrete culvert sections, and studies of soil loadings on culvert pipe as a basis for certain standardizations contemplated in design.

The trip was considered an unofficial sub-committee meeting of the Joint Concrete Culvert Pipe Commitee, an organization which has come into existence this year by appointment of representatives by a number of the technical societies for co-operative study of culvert pipe specifications. During the year, a number of societies have appointed two members each on the Joint Committee, under the chairmanship of H. T. Shelley, assistant engineer of sewer construction, department of public works, Philadelphia.

The organizations with their representatives are as follows:

American Concrete Institute.—B. S. Pease, American Steel & Wire Co., 208 South LaSalle street, Chicago; A. B. Cohen, Delaware, Lackawanna & Western R. R., Hoboken, N. J.

American Association of State Highway Officials.—T. R. Agg, Iowa State College, Ames, Iowa; J. N. Mackall, Maryland State Roads Commission, Garret Bldg., Baltimore, Md.

American Railway Engineering Association.—Job Tuthill, chief engineer, Pere Marquette Ry., Detroit, Mich.; A. F. Robinson, bridge engineer, Atchison, Topeka & Santa Fe, Railway Exchange Bldg., Chicago.

American Society for Testing Materials.—H. T. Shelley, assistant engineer, sewer construction, department of public works, 416 City Hall, Philadelphia, Pa.; A. E. Phillips, sanitary engineer, 2115 Bancroft place, Washington, D. C.

American Society of Civil Engineers. —Geo. H. Tinker, bridge engineer, N. Y. C. & St. L., 516 Columbia Bldg., Cleveland, Ohio; T. L. D. Hadwen, engineer of masonry construction, C. M. & St. P., Railway Exchange Bldg., Chicago.

American Concrete Pipe Association. —Paul Kircher, Massey Concrete Products Corp., 50 Church street, N. Y. C.; C. F. Buente, Concrete Products Co. of America, Diamond Bank Bldg., Pittsburgh, Pa.

Office of Public Roads.—T. H. MacDonald, director, Office of Public Roads, Dept. of Agric., Washington, D. C.; A. T. Goldbeck, Office of Public Roads, Dept. of Agric., Washington, D. C.

There are four sub-committees as follows: No. 1, Classifications and Loading Requirements.—T. R. Agg, chairman, B. S. Pease and Job Tuthill; No. 2, Design.—Job Tuthill, chairman; No. 3, Methods and Requirements of Tests.—A. E. Phillips, chairman; No. 4, Workmanship and Installation.— A. B. Cohen, chairman. Personnel of the last three has not yet been completed.

Sub-Committee on Classifications and Loading Requirements is the subcommittee primarily concerned with the loading and breaking test now being conducted at Ames, which will furnish basis for standardization in the design of pipe for both railway and highway purposes.

An important feature in the organization of this committee is the fact that the associations and societies represent not only the consuming and producing interests but also the neutral technical societies such as the American Society of Civil Engineers and the American Society for Testing Materials. The result of the work of this committee should be a thorough understanding of the elements involved in design and perhaps a certain amount of standardization in the details of manufacture will be possible if mutually agreeable to manufacturers and users.

A thorough understanding of this problem and the use of standard specifications by the highway departments of various states and bridge and building departments of various railroads, so far as this is possible, will result in eliminating unnecessary expense in some cases and providing adequate strength in others.

Those attending the meeting at Ames were as follows: T. R. Agg, Job Tuthill, A. F. Robinson, G. H. Tinker, C. F. Buente, J. E. Moody, M. W. Loving, J. L. Zeidler, C. H. Wilson, G. E. Warren, secretary, V. E. Sladek, representing B. S. Pease..

Dean Marston of Iowa State College extended the party a cordial welcome and discussed the problems of culvert pipe specifications.

### Tire Company Builds Dormitory for Employees.

To help relieve the serious housing conditions existing in Akron, Ohio, caused by the wonderful growth of the city, **The Goodyear Tire & Rubber Company** announces that a $200,000 girls' dormitory will be erected immediately. This dormitory will ac-accommodate 175 girls and is designed for use by the many girls that are constantly coming to Akron to take positions with the company. The building is to be a three story brick structure, situated in the Goodyear Heights community near the factory. The management of the dormitory will be vested in the social service department of which Miss Clara E. Bingham is manager. The project will be operated on a cost basis as there is no desire on the part of the company to profit from its operation. The girls will pay for their accommodations at actual cost to the company.

## NEWS OF THE SOCIETIES

*(Continued from page 357)*

engineers employed by the city of St. Louis has been passed by the board of aldermen of that city. This bill was prepared by the municipal section of the St. Louis Chapter of the American Association of Engineers last spring, and its passage is the culmination of a campaign which has been waged since to have it enacted into law.

The bill had previously been endorsed by a number of engineers and employes as containing provision for reasonable increases in salaries, and had been endorsed by the efficiency board. The board of estimate and apportionment was the stumbling block which prevented the progress of the bill up to the board of aldermen for passage, and the fact that it has now approved the bill means that the increased salaries will go into effect January 1st.

The success of the municipal section of the St. Louis Chapter of A. A. E. in obtaining these results is largely due to the efforts of Ernest Paffrath and George Grimm, Jr., respectively president and secretary of the section.

Following a recent hearing granted to the engineer employes of the city of Cleveland before the Board of Control of that city, the latter body authorized an increase of 10 per cent in salaries of professional engineers employed by the city.

## PERSONALS

Marble, Arthur C., who has served the city of Lawrence, Mass., continuously since 1875, has resigned as city engineer, retiring to private life. Robert W. Priestman, first assistant to Mr. Marble for a number of years, has been named city engineer.

Stanley, Capt. William E., Engineers, U. S. A., who recently returned from 20 months' service in France, has received his discharge and has accepted a position with Pearse & Greeley, consulting sanitary and hydraulic engineers, Chicago. Mr. Stanley will be resident engineer on the construction of a sewer system for South Charleston, W. Va.

Wigley, C. G., formerly chief engineer of the New Jersey State Department of Health, is now employed as engineer with Clyde Potts, 30 Church street, New York City.

Wiley, Rodman, formerly state highway commissioner of Kentucky, has recently become chief engineer of the Kentucky Rock Asphalt Co. Previous to becoming highway commissioner, Mr. Wiley was bridge engineer of the Department of Public Roads of Kentucky. He became an associate member of the American Society of Civil Engineers in 1914.

Kennedy, Cornelius, veteran West Virginia street paving contractor, died at his home in Parkersburg, W. Va., Dec. 7, at the age of 83. Mr. Kennedy entered the paving business in the early 80's and constructed the first brick pavements in many cities in West Virginia, Ohio and western Maryland. He took an active part in construction work until a few months before his death, being the senior member of C. Kennedy & Son. Recently Mr. Kennedy disposed of his interests to the Kennedy Construction Co., of which his son, John R. Kennedy, who has been associated with him since boyhood, is president and general manager.

## UNITED STATES CIVIL SERVICE EXAMINATION.

### Fire-Prevention Engineer
### January 13, 1920.

The United States Civil Service Comission announces an open competive examination for fire-prevention engineer. Vacancies under the Quartermaster General, War Department, office of the Director of Purchase and Storage, for duty throughout the United States, at $2,500 to $4,000 a year, will be filled from this examination.

Both men and women, if qualified, may enter this examination, but appointing officers have the legal right to specify the sex desired in requesting certification of eligibles. For positions in the office of the Director of Purchase and Storage male eligibles are desired.

The principal duties of appointees will be the conducting of investigations leading to improvements in fire-prevention installations, equipment, and devices, and to make suitable recommendations. These duties are such that appointees should be familiar with building construction in general and with drawings and specifications; with the installation, use, and relative advantage of fireproof building materials; have general knowledge of water-supply systems, and be familiar with the installation, use, and relative merit of fire-prevention equipment and devices; and they should be able to determine the presence of existing fire hazards and to make specific recommendations regarding same. They must be able to conduct tests of fire-prevention and fire-fighting equipments and to make intelligent reports.

Competitors will not be required to report for examination at any place, but will be rated on the following subjects, which will have the relative weights indicated:

| Subjects | Weights |
|---|---|
| 1. Physical ability ................ | 10 |
| 2. Training and experience ....... | 90 |
| Total ........................... | 100 |

The prerequisites for consideration for this position are graduation from a four years' high school course or equivalent education, and three years of responsible experience in making or supervising fire-prevention inspections and installing fire-prevention methods in Government storage houses, military posts or other Government plants, or in large commercial or manufacturing plants. The completion of each year of an engineering coure in a college or university of recognized standing will be accepted as equivalent to six months of the required experience. For each year lacking of the high-school course an additional year of the required experience will be accepted.

Applicants should at once apply for Form 1312, stating the title of the examination desired, to the Civil Service Commission, Washington, D. C.

# The Municipal Index

p. 31-42

In Which Are Listed and Classified by Subjects All Articles Treating of Municipal Topics Which Have Appeared During the Past Month in the Leading Periodicals.

It is our purpose to give in the second issue of each month a list of all articles of any length or importance which have appeared in all the American periodicals and the leading ones published in other countries, dealing more or less directly with municipal matters. The Index is kept up to date, and the month of literature covered each time will be brought up to within two or three days of publication. Our chief in this is to keep our readers in touch with all the current literature on municipal matters. In addition to the titles, where these are not sufficiently descriptive or where the article is of sufficient importance, a brief statement of its contents is added. The length also is given, and the name of the author when it is a contributed article. Also the name and the place of publication of the periodical in which it appeared.

## ROADS AND STREETS.

**Work for 1920:**

Wisconsin Highway Work for 1920. More than $6,000,000 worth of federal and state aid work contemplated. 1 table, 500 words. Municipal Journal and Public Works, Nov. 1, New York.

Road Work in 1919 and 1920. Text of letter from Chief of Bureau of Public Roads to state highway departments reviewing work of 1919 and forecasting work of 1920; influence of transportation; need of early awards. By T. H. McDonald. 1,300 words. Good Roads, Nov. 26, New York.

Highway Work in Nebraska. $7,019,904 available at present time for road work. 150 words. Municipal Journal and Public Works, Nov. 1, New York.

Next Year's Road Work. Editorial reference to letter by Chief MacDonald of Bureau of Public Roads printed in this issue. 1,000 words. Good Roads, Nov. 26, New York.

Indiana State Highway Program. Commission plans to build 300 miles in 1920; contracts for over 130 miles awarded in 1919. 250 words. Good Roads, Oct. 29, New York.

Preparing for 1920 Road Work. Editorial. 200 words. Municipal Journal and Public Works, Nov. 8, New York.

What About Materials for Our Road Building Programs? 1,500 words. Engineering World, Nov. 15, Chicago.

Indiana's State Highways. $100,000,000 will be spent during next ten years, according to Governor Goodrich. 1 map, 200 words. Municipal Journal and Public Works, Nov. 1, New York.

Proposed Paving Program in St. Louis County, Mo. Brick and asphaltic paving at cost of over $2,000,000 proposed by state highway engineer. 300 words. Good Roads, Oct. 29, New York.

**Brick Pavements.**

Paving Brick Manufacturers Seek Specification Changes. Lugless brick, standard sand cushion for bituminous fillers and 4-inch base, are among features proposed. 1,200 words. Editorial reference, 400 words. Engineering News-Record, Nov. 13-20, New York.

Success of Asphalt Joint-Filler in Vertical-Fiber Brick Pavements. By C. R. Mandigo, consultg. engr., Western Paving Brick Mfrs.' Ass'n, Kansas City, Mo. 1,100 words. Municipal and County Engineering, November, Indianapolis, Ind.

Vertical Fiber Brick Pavement. Advantages of this type and some of the latest developments; no lugs and bituminous filler. 2,200 words. Municipal Journal and Public Works, Nov. 1, New York.

Is Beam Strength the Important Item in Brick Roads? Valuation of theory must be weighed by experience and practical application; practice shows beam strength not essential. By W. P. Blair, vice-pres., Natl. Paving-Brick Manufacturers' Ass'n. 2,000 words. Engineering News-Record, Oct. 9, New York.

Asphaltic Filler for Brick Pavements. Why sand filler failed; applying asphaltic filler; sand should be hot. By A. D. Dimmick, Asphalt Sales Dept., Texas Co. 2 ills., 1,300 words. Municipal and County Engineering, November, Indianapolis, Ind.

**Concrete Pavements:**

Cement Concrete Pavements in New Zealand and the United States and Canada. Paper before Roads and Transport Congress, London, by W. E. Bush, city engr., Auckland, N. Z. 5,000 words. Journal of the Institution of Municipal and County Engineers, Nov. 22, London, England.

Protecting Concrete Pavements During Setting. Description of light portable frame devised by G. J. Lynch of Uniontown, Pa. 1 ill., 400 words. Municipal Journal and Public Works, Nov. 15, New York.

Does Rich Concrete in Roads Crack More Than Lean? Letter to editor from B. H. Tong, chief inspector, Concrete Paving, Bismarck, N. D. 500 words. Engineering News-Record, Oct. 23, New York.

An Appraisal of Modern Plant Performance in Concrete Road Construction. Increasing use of machine instead of hand methods only emphasizes importance of managerial ability and organizing genius on part of contractor; machinery cannot make a road job. By H. D. Hammond, Lakewood Engrg. Co., Cleveland, O. 6 ills., 4,000 words. Engineering News-Record, Oct. 30-Nov. 6, New York.

New Specifications of Indiana Highway Commission for Concrete Roads. 1 page ills., 2,000 words. Engineering and Contracting, Nov. 5, Chicago.

Side Hill Loading Plant for Concrete Road. Batch boxes successfully charged through bottom gates in horizontal storage platform built out from hillside. 2 ills., 1,000 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

Concrete Substitutes for Stone. No limit to use of concrete. Letter to editor from a city engineer. 500 words. Municipal Engineering and Sanitary Record, Nov. 20, London, England.

Recent Developments in Concrete Highway Construction. Improved methods of finishing; use of machinery; alley construction; use of reinforcement; reducing prices for pavements. By A. N. Johnson, consltg. hwy. engr., Portland Cement Ass'n, Chicago. Paper before American Society for Municipal Improvements. 3,500 words. Municipal and County Engineering, November, Indianapolis, Ind.

Utilization of Old Concrete Pavements as Foundations. By A. Blanchard, prof. of hwy. engrg., Ann Arbor, Mich. 6 ills., 3,500 words. Municipal and County Engineering, November, Indianapolis, Ind.

Method for Simplifying Concrete Alley Paving. Difficulty overcome by Metzel & O'Hearn, contractors, in Covington, Ky. 1 ill., 400 words. Engineering and Contracting, Nov. 5, Chicago.

Precautions for Concrete Pavement Construction in Cold Weather. 1,600 words. Engineering and Contracting, Nov. 5, Chicago.

Effective Use of Machinery in Concrete Road Construction. Excellent example afforded by new highway now being built between Martin's Creek and Bangor, Pa. 1 ill., 500 words. Engineering and Contracting, Nov. 5, Chicago.

Central Loading Plant Facilitates Street Paving Work. Employed by J. S. McLaughlin & Sons, Red Oak, Ia., in constructing 95,865 square yards concrete street paving at Spencer, Ia. 700 words. Engineering and Contracting, Nov. 5, Chicago.

**Bituminous Pavements.**

Relative Advantages of Single and Double Coat Road Surfacing Work Carried Out in Bitumen (as Distinct from Tar Compounds). Paper before Roads and Transport Congress, London, by F. Wood, borough engr. and surveyor, Blackpool. 2,000 words. Journal of the Institution of Municipal and County Engineers, Nov. 22. London, England.

Asphaltic Macadam (Bituminous) Roads, and Their Extended Use. Paper before Roads and Transport Congress, London, by H. T. Wakelam, co. engr. of Middlesex. 4,000 words. Journal of the Institution of Municipal and County Engineers, Nov. 22, London, England.

Bituminous Concrete and Brick Roads for Indiana. New state specifications for brick paving and bituminous paving on concrete base; special brick on grades. 1,700 words. Engineering News-Record, Oct. 30-Nov. 6, New York.

Hot-Mix Asphalt Pavements. Comprehensive details regarding this type of modern pavement. By F. P. Smith, chemical engr., N. Y. C. 4 ills., 4,000 words. American City, October, New York.

Storage Tanks for Road Oil Cut Out Demurrage. By C. E. Murphy, Asphalt Sales Dept., The Texas Co. 1 ill., 900 words. Engineering and Contracting, Nov. 5, Chicago.

**Macadam and Others.**

Resurfacing Old Macadam Streets in Milwaukee. Cost and method employed. By C. J. Van Etta, supt. of street constr. and repair, Dept. Pub. Works. 4 ills., 1,200 words. Municipal and County Engineering, November, Indianapolis, Ind.

Kentucky Practice in Construction of Water Bound Macadam. From paper at Road School at University of Kentucky, by M. D. Ross, div. engr., Dept. of Pub. Roads, Newport, Key. 3,000 words. Engineering and Contracting, Nov. 5, Chicago.

Construction and Maintenance of Gravel Roads. Paper before New Hampshire Good Roads Ass'n, by F. H. Colburn, ass't state engr., N. H. State Hwy. Dept. 4 ills., 1,800 words. Good Roads, Nov. 12, New York.

New Joint Spacer for Wood Block Pavements. Description of methods employed in construction of wood block pavement in the street railway track area in St. Thomas, Ont. By J. S. Crandell, consltg. engr., Gen. Tarvia Dept., The Barrett Co. 2 ills., 300 words. Good Roads, Nov. 26, New York.

Surfacing Old Granite Pavements. Editorial reference to method adopted in many American cities. 250 words. Municipal Engineering and Sanitary Record, Nov. 13, London, England.

**Foundations:**

Concrete Foundations to Wood, Etc., Paving. Adverse to breaking up old concrete. Letter from B. Cooper, borough surveyor of Paddington. 500 words. Municipal Engineering and Sanitary Record, Nov. 20, London, England.

Concrete Foundations to Wood, Etc., Paving. Honeycombed concrete and subways. Letter to editor from E. F. Spurrell, borough of Holburn. 800 words. Editorial reference, 500 words. Municipal Engineering and Sanitary Record, Nov. 6, London, England.

Foundations for Pavements. Macadam base preferable to cement concrete for brick, bituminous concrete and other

(*Continued on page* 33)

000,000 bonds authorized for project. Comr. Engel of Pub. Works Dept. will advertise for bids on subway contract.

**Mich., Muskegon Heights**—Representatives at State Hwy. Comn. recommended State highway be constructed on Peck Blvd. and Summit and Merriam Sts.

**Mich, Grand Rapids**—Bids received by city clerk until Jan. 5 on bonds of $50,000 and 70,000 for street improvement.

**Minn., Blooming Prairie**—City having plans prepared for 1,500 sq. yds. paving. Bids reecived on all types of pavement; $100,000. J. W. Schaeffr & Co., New York Life Bldg., Minneapolis, Engr.

**Minn., Madison**—City having surveys made for 40,000 sq. yds. paving. Bids received on all types of pavement; $200,000. J. W. Shaffer & Co., New York Life Bldg., Minneapolis, Engrs.

**Mo., St. Louis**—Ordinance drafts authorizing total expenditure of $180,000 for street improvement during next year were approved by Board of Public Service. Bills include appropriation of $117,150 for improvement of King's Highway, $25,800 for Gannett Ave., $20,650 for Ellenwood Ave., $8,500 for Tennesse Ave., and $7,350 for grading Clifton Ave.

**Miss., Vicksburg**—Election upon $400,000 bonds for paving streets is contemplated. The Mayor.

**Miss., Moss Point**—City will vote Dec. 30 on $25,000 street bonds.

**Neb., Omaha**—City Comr. Towl and City Engineer Bruce reported to City Council approval of regrading and repaving St. Marys Ave. Work will involve $200,000.

**N. Mex., Roswell**—City plans to expend $800,000 for paving principal business streets.

**N. Y., Albany**—According to plans of State Highway Comr. Greene 10.95 miles in Albany Co. will be reconstructed in 1920. This will include part two of Albany-Schenectady Rd. and River Rd Commissioner has designed 750 miles new roads for 1920 and listed 1,054 miles for resurfacing and 350.70 miles for reconstruction. Concrete will be used in all roads.

**N. Y., Albany**—In addition to 750 mi. of roads for construction in 1920, Hwy.. Comr. Frederick S. Greene has listed 1,054 mi. for resurfacing, 350 mi. for reconstruction in 57 counties of State. Concrete to be used in nearly all roads ordered rebuilt. In Suffolk Co. the Amityville-Babylon, Amityville Village and Babylon Village roads will be reconstructed and 6 mi. resurfaced. In Nassau Co., Jericho Turnpike-Plainview road will be reconstructed and 14.47 mi. resurfaced.

**N. Y., Brooklyn**—Bd. of Estimate received recommendations for improvement of 26 streets.

**N. C., Asheville**—McDowell Co. Comrs. have just sold A. T. Bell Co., of Toledo, O., $100,000 road bonds. Money will be used by McDowell Comrs. for building connecting highways with Buncombe and Burke Counties.

**N. C., Durham**—Durham Co. Comrs. plan to hard surface main highways, 18 ft. wide, $300,000. F. E. Schnepfe, Co. Engr.

**N. C., Hendersonville**—$3,000,000 for hard surface roads is objective of campaign waged here. Federal and State aid in construction of the roads will be sought.

**Okla., Tecumseh**—Election will be held soon in Pottawatomie Co. to vote following road bonds: Davis Twp., $100,000; Earlsboro Twp., $50,000; Brinton Twp., $50,000.

**Okla., Tecumseh**—Pottawatomie Co. voted $500,000 bonds to build roads in Earlsboro, Davis, Brinton, Forest and Rock Creek Twps. L. L. Winans, Tecumseh, Engr.

**O., Newark**—City engineer estimates cost of paving and sewers in Hudson Ave., Channel St. and North 4th St., at $64,000.

**O., Lima**—James C. Mackensie of Bd. of Comrs. states that road program in Allen Co. next year will include 24 mi. new construction. State will contribute $300,000.

**O., Lorain**—County Comrs will pave Lake Shore Rd. 3 mi., at cost $129,000, with either bituminous concrete reinf. concrete or brick.

**Ore., Klamath Falls**—Klamath Irrigation Dist. will decide in January on issuing bonds amounting to $175,000 for construction work in said district.

**Ore., Eugene**—Lane Co. voted special levy of $60,000 as mileage tax in different districts to maintain roads during 1920.

**Pa., Bethlehem**—Mayor of city will receive bids until Dec. 29 for street pavings bonds of $155,000.

**Pa., Johnstown**—Bids received until Jan. 5, 1920 for $500,000 Cambria Co. road bonds. H. T. Jones, Co. Controller.

**Pn., Bethlehem**—Ordinances were introduced in City Council and considered as follows: To pay cost of installation of ornamental street lighting fixtures, $80,000; for street paving, West 4th St., $11,000; Lehigh Ave., $20,200; Goepp St., $18,000; Conestoga St., $21,500; Mauch Chunk Rd., $22,000.

**R. I., Providenee**—City council orders curbs to be laid on seven streets and gutter to be paved.

**S. C., Spartanburg**—Spartanburg will spend $100,000 on roads of so-called Greer area of county, in which Greenville authorities recently promised to expend $875,000 provided that area become a part of Greenville Co. Members of county delegation signed agreement to introduce bill authorizing additional bonds for road building.

**Tex., Angletonn**—Citizens will vote Jan. 24 on issuing bonds of $100,000 for hard surfacing roads from Houston to Galveston to Freeport.

**Tex., Hondo**—Medina Co. voted bond issue of $800,000 for road construction.

**Tex., Honey Grove**—At special election to determine whether or not people would adopt amendment to city charter providing for permanent street improvements carried. City expects to do street paving as soon as weather settles.

**Tex., Orange**—Chamber of Commerce went on record as favoring construction of high class concrete road from Orange to Beaumont. Hwy. Comm. will recommend to Orange Co. $400,000 be devoted to building this road and appropriations of $200,000 each be sought from federal and State Hwy Depts., making total of $800,000.

**Tex., Corsieana**—Navarro Co. voted $35,000 bonds to build roads in Dist. No. 6. R. J. Windrow, Austin, State Hwy. Engr.

**Tex., Gainesville**—Bond issue of $225,000 for roads voted in Era and Valley View Dists. of Cooke Co. Address H. S. Holman, Co. Judge.

**Tex., Frederieksburg**—Gillespie Co. is drawing plans for road building to cost $113,313.75. A. F. Moursang, Engr.

**Wash., Spokane**—Early in 1920 bids will be received for construction of 4 mi. of hard surfaced roadway from Liberty Lake junction to State line. Road will cost $90,000. Apple Way will require 5 mi. concr. surface; cost $160,000. Two and a half miles pavement, probably concrete, in Otis Orchard district; cost $75,000. Fifty thousand dollars will be expended on Long Road.; 5 miles will be paved with crushed rock. Monroe Rd. will get $50,000. Day Rd. will require $40,000; 3 mi. will be surfaced with crushed rock or gravel. County is giving $70,000 to city for use in improving arterial connection to city in Stafford's addition.

**Wash., Aberdeen**—Bond issue of $1,200,000 proposed to make possible $4,000,000 road building program in Grays Harbor Co. during next five years, was indorsed at recent election.

**Wash., Chehalis**—At good roads meeting of Dist. 25 in Mossyrock paved road from west boundary line of Lewis was discussed. Special committee to start county bonding plan was named.

**Wash., White Salmon**—Board of co. comrs. decided to advertise for bids on construction of concrete road between here and Trout Lake. Engineer's estimate $411,000.

**Wash., Kelso**—Nearly 2 mi. of streets will be improved by grading and concrete sidewalks and curbs, according to plans of City Council.

**W. Va., Kingwood**—Various road improvements contemplated in Preston Co. Estimate, $64,000. H. T. Wilhelm, Engr. .

**W. Va., Logan**—J. W. Smith is preparing plans for Comrs. of Logan Co. for road improvements; total cost, $1,000,000. Work will start in spring.

**Wis., Neillsville**—Road construction for Clark Co, 1920, will cost $27,310.53, principally grading and draining. W. C. Thoma, Neillsville, Wis.

**Wis., Barron**—Road construction program was voted by Barron Co. amounting to $23,461.79 Also Portage Co. vote program of $19,035.77.

**Wis., Ft. Atkinson**—City plans to grade, drain and surface 2.8 mi. Watertown Plank Rd., 18 ft. wide, concrete; $95,000. R. D. Rogers, Co. Engr.

**Wis., Port Washington**—City plans to grade, pave and drain 2.8 mi. Lake Shore Rd., 18 ft. wide, rein. concr., $90,000. J. H. Mueller, Thiensville, Engr .

**Wis., Sparta**—Monroe Co. Bd plans to spend $25,849.57 for grading and draining 15 roads. C. H. Millard, Sparta, Wis.

**Wis., Fond du Lac**—Fond du Lac Co. indorsed proposition to issue bonds of $4,600,000 for construction of permanent highways.

**B. C., Port Hardy**—It is reported that Provincial Govt. will construct highway between Port Hardy and Coal Harbor next year. Minister of Pub. Works, Hon. J. H. King, Victoria.

**P. E. I., Charlottetown**—Government is planning to take advantage of federal road grant and expect to expend $400,000 on roads next year.

**Ont., Belleville**—City having plans prepared and soon receives bids paving William, Charles, Ann, John, Bridge and Pinnacle Sts. Work involves 38,000 sq. yds., 28-33 ft' wide, asphaltic concr. on concr. base; $110,000. J. G. Mill, City Engr.

## BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

***Ark., Little Rock**—Morgan Constn. Co. of Little Rock has been awarded contract for construction of Southwestern Impvt. Dist. No. 1, from Hot Springs to New Hope, 60 mi., for $540,000.

***Ark., Fayetteville**—Contract for 31 mi. hard surface road awarded Phillips Constn. Co., Fayetteville, at $161,417.

**Ind., Evansville**—Only one bid was received by the Co. Comrs. for improvement of King Rd. in Center Twp. Bid, $17,631, was submitted by Martin & Thornburg.

**N. Y., Albany**—Mohawk Dock & Dredge Co., next to lowest bidder for first contract of Great Western Gateway project, decline to accept contract at its bid, $228,000. Lowest bidder was Walsh Construction Co., of Davenport, Ia., which originally offered to do the work for $190,000, but declined because of rise in materials and labor. Supt. Pub. Wks. now has asked American Pipe & Construction Co., of Philadelphia, third lowest bidder, to accept job at bid, $235,000.

***N. C., Raleigh**—State Hwy. Comn. let contract for building 21 mi. of road on Central Hwy. in Lenoir Co. Total cost of 21 mi., $705,000. W. H. Gill Co., of Binghampton, will do grading and draining, and laying of sheet asphalt will be done by West Constn. Co., of Chattanooga.

**Ore., The Dalles**—United Contracting Co. of Portland received contract for grading, basing and surfacing 9 blocks on Elm St., Kelly Ave. and W. 8th St. for total $39,167.80. Construction will start at once.

**Pa., Harrisburg**—Following bids received Dec. 16, 1919 by State Hwy. Dept.: Allegheny Co., 10,452 ft., one course reinf. concr. pavement, Foster-Waring Constn. Co., Pittsburgh, Pa., $136,081.30.

Armstrong Co., 10,610 ft. one course reinf. concr. pavement, Summit Constn. Co., Akron, O., $119,882.90.

Beaver Co., 5,447 ft. one course reinf. concr. pavement, W. S. Morrison, New Brighton, Pa., $55,939.90.

Beaver Co., 13,592 ft. one course reinf. concr. ad Hillside brick pavement, Foster-Waring Constn. Co., Pittsburgh, Pa., $155,959.20; S. B. Markley, Rochester, Pa., $150,770.95.

Beaver Co., 12,062 ft. one course reinf. concr. and Hillside vit. brick, Jones Constn. Co., Salem, O., $199,920.90; Samuel Gamble Co., Carnegie, Pa., $180,920.60.

Beaver Co., 5,200 ft. one course reinf. concr. pavement, Jones Constn Co., Salem, O., $97,806.10; M. J. Scanlon, Newcastle, Pa., $96,178.80.

Berks Co., 29,700 ft. one course reinf. concr. pavement, Henry E Baton, Philadelphia, $251,857.05; Weller Constn. Co., Inc., Washington, D. C., $221,128.35.

# The Municipal Index

kinds of wearing surface; opinions of four speakers at the A. S. M. I. convention. 2,500 words. Municipal Journal and Public Works, Nov. 15, New York.

Non-Rigid Pavement Foundations. At American Society for Municipal Improvements, several paving experts advocated use of old macadam or new macadam as preferable to new concrete base for durable pavements. Editorial. 300 words. Municipal Journal and Public Works, Nov. 15, New York.

Tile Drainage for Iowa County Highways. Untiled areas of "seedling mile" concrete road cracked, while later sections laid with tile remained intact. By J. A. King, Mason City, Ia. 1 ill., 1,200 words. Engineering News-Record, Oct. 23, New York.

**Maintenance:**

Tractor for Road Maintenance. Comparative costs of grader maintenance in Cherokee county, S. C., by kerosene tractor and by mule team power. 1 ill., 300 words. Good Roads, Oct. 29, New York.

How Drivers Can Help Maintain Good Roads. 400 words. Engineering and Contracting, Nov. 5, Chicago.

Gang Patrol System for Maintenance of Lucas County, Ohio, Highways. 2 ills., 500 words. Engineering and Contracting, Nov. 5, Chicago.

Prepare Roads for Winter. Editorial. 150 words. Municipal Journal and Public Works, Nov. 8, New York.

Compressed Air Used to Clean Road Surface Before Oiling. Road first swept with brooms and then blown with compressor; cost of cleaning and application of binder given. By Maj. W. A. Welch, chf. engr. and gen. mgr., Palisades Interstate Park. 1 ill., 1,200 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

**Principles:**

Road Impact Tests. Have been continued by Bureau of Public Roads during past few months with Class B army truck, 5½ ton, equipped with solid tires. 500 words. Municipal and County Engineering, November, Indianapolis, Ind.

Impact of Trucks Upon Road Surfaces. Preliminary report on experiments being carried on by the Bureau of Public Roads to determine effect upon road surfaces of motor trucks running at various rates of speed. By E. B. Smith and J. T. Paulssen, ass't testing engr. and hwy. engr., respectively. 3 ills., 1,500 words. Editorial comment, 600 words. Good Roads, Nov. 5, New York.

Comprehensive Investigation in Highway Engineering Needed. No adequate basic theories; difficulties of problem. By T. R. Agg, Iowa State College. 1,400 words. Southern Good Roads, November, Lexington, N. C.

Engineers Teach Doctrine of Designed Roads. Systematic instruction converts Iowa to active support of engineering direction of road construction work. 2,200 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

Problems Affecting Design and Construction of Highways. From address before N. Y. Chapter of American Ass'n of Engrs., by W. G. Thompson, state hwy. engr., N. J. 1,200 words. Canadian Engineer, Nov. 20, Toronto, Can. Engineering and Contracting, Nov. 5, Chicago.

Paving Half-Roads. Only possible plan for avoiding detours is to complete one-half of stretch of road, traffic meanwhile using other side of center line of road; advantages of marking line down center of a paved road. 700 words. Municipal Journal and Public Works, Nov. 22, New York.

General Principles of Road Administration. Equitable form of taxation must be evolved; road building under bond issue. From paper before Engineers' Club of Northern Minnesota, by R. W. Acton, county engr., St. Louis co., Minn. 2,400 words. Engineering and Contracting, Nov. 5, Chicago.

New Method for Adjusting Earth Excavation and Determining Haul. Use of excess area diagram; allignment and grade revisions for balancing quantities. 10 ills., 3,200 words. Engineering and Contracting, Nov. 5, Chicago.

**Streets:**

New San Francisco Street Signs. 2 ills., 300 words. Municipal Journal and Public Works, Nov. 15, New York.

Shade Trees for Business Streets. Sacramento, Calif., vastly improves trade center with attractive foliage. 2 ills., 500 words. American City, November, New York.

Baltimore's Paving Recorded by Map and File System. Complete data of even oldest pavements are being compiled; special colored maps and supplementary card system used. By R. K. Compton, chn. and consltg. engr., Baltimore Paving Comm. 2 ills., 1,100 words. Engineering News-Record, Nov. 13-20, New York.

Characteristics of Pavement Types and Consideration Affecting a Choice in Kansas Cities. By A. P. Learned, of Black & Veatch, consltg. engrs., Kansas City, Mo. 3,700 words. Municipal and County Engineering, November, Indianapolis, Ind.

**Financial:**

Good Roads Without Great Debt in Bond Issues. New Iowa law provides pay-as-you-go plan for 6,278-mile system of state roads; motor vehicle fees to be utilized. 2 ills., 1,200 words. Engineering News-Record, Oct. 9, New York.

$1,265,000,000 of Highway Bond Issues Proposed or Authorized in 1919. 300 words. Engineering and Contracting, Nov. 5, Chicago.

Proper Use of Federal Aid Funds. Discussion of resolution: "Resolved, That Federal Aid Funds Should Be Used Only for the Construction of Trunk Line Roads and Bridges of Adequate Width and Strength." By N. P. Lewis, chf. engr., Bd. of Estimate and Apportionment, N. Y. C. Paper before American Road Builders' Ass'n. 1,500 words. Good Roads, Nov. 19, New York.

Proposed Schedule of Salaries for Engineers in State Highway Service. 1,300 words. Municipal and County Engineering, November, Indianapolis, Ind.

**Miscellaneous:**

Texas Progress Chart. Issued biweekly and contains records for 117 federal aid projects and 98 state aid. 1 ill., 300 words. Municipal Journal and Public Works, Nov. 8, New York.

Road Site Built Up by Grass. 1 ill., 250 words. Municipal Journal and Public Works, Nov. 8, New York.

The American Highway Problem. President A. R. Hirst's address before the American Ass'n of State Highway Officials, Louisville, Ky. 6,500 words. Engineering News-Record, Nov. 13-20, New York.

The Future Highways of Vermont. Present progress too slow; necessity of making study of problem; kind of system needed; types of roads to be built; highway department organization; cost of the work. By T. W. Dix, ass't prof. of highway engrg., University of Vermont. 1,800 words. Good Roads, Nov. 26, New York.

Good Roads in Europe. From article in Charlotte Observer by the editor, W. H. Harris, while traveling in Europe. 1 ill., 1,500 words. Southern Good Roads, November, Lexington, N. C.

Highways to Lower the H. C. L. Cost of transportation big factor in price of goods. By J. S. Beal. 2 ills., 1,600 words. Southern Good Roads, November, Lexington, N. C.

Interstate Highways Must be Built by the State. Address by W. A. McGirt, pres., N. C. Good Roads Ass'n. 1,300 words. Southern Good Roads, November, Lexington, N. C.

Reconstruction of Narrow Trunk Highways. Progress report of committee of American Road Builders' Association on "Reconstruction of Narrow Roadways of Trunk Highways with Adequate Foundations and Widths for Motor Truck Traffic." 900 words. Good Roads, Nov. 19, New York.

Good Roads as Factors in Reducing Transportation Costs. Day not far distant when trucks will be run over specially built highways. By E. A. Williams, Jr., pres., Garford Motor Truck Co. 1,200 words. Good Roads, Nov. 19, New York.

Progress in Road Paving. Editorial reference to facts brought out at the convention of the American Society for Municipal Improvements. 150 words. Municipal Journal and Public Works, Nov. 8, New York.

Problems Before Road Builders. Editorial reference to the presidential address at American Road Builders' Association, published in this issue. 1,200 words. Good Roads, Nov. 12, New York.

Presidential Address at Annual Meeting of American Road Builders' Association. By G. P. Coleman, state hwy. engr. of Virginia, elected president of the association. 1,500 words. Good Roads, Nov. 12, New York.

Colorado Highways. Up to November federal aid projects approved totaled 882.9 miles. 100 words. Municipal Journal and Public Works, Nov. 1, New York.

Hard-Surfaced Roads. Discussion of different types, with special reference to conditions in North Carolina; methods of construction and causes of failure of different pavements. Paper before N. C. Good Roads Ass'n, by E. J. Wulff, sen. hwy. engr., Bureau of Public Roads. 3 ills., 2,500 words. Good Roads, Oct. 22. 3 ills., 2,000 words, Oct. 29, New York.

Labeling Roads. Editorial advocating erecting along improved roads sign designating kind of pavement, date of construction and name of contractor. 800 words. Good Roads, Oct. 29, New York.

Permanent Pavements at Railway Stations and Freight Terminals. By C. Campbell. 6 ills., 1,000 words. Engineering World, Nov. 15, Chicago.

Suggested General Highway Traffic Regulations. By the highways transport committee of the U. S. Council of Nat'l Defense. 3 ills., 2,700 words. American City, October, New York.

Economic Status of Guarantees for Pavements on Roads and Streets. Final report of committee to American Road Builders' Ass'n. 1,200 words. Canadian Engineer, Nov. 27, Toronto, Can.

Use of a Self-Computing Level Rod in Highway Surveys. By R. T. Brown, chief of surveys, State Highways Dept. of South Carolina. 1,200 words. Engineering and Contracting, Nov. 5, Chicago.

American Road Builders' Association. Account of the meeting held in New York. 2,200 words. Good Roads, Nov. 12, New York.

Roads and Transport Congress and Exhibition. Preliminary survey and description of exhibits. 10 ills., 8,500 words. Municipal Engineering and Sanitary Record, Nov. 13, London, England.

## SEWERAGE.

**Sewers:**

Building the Augusta Street Concrete Intercepting Sewer. Excavation on the sewer; the invert; forms for the arch; crossing street railway. By W. T. Christine. 4 ills., 1,900 words. Engineering World, Nov. 1, Chicago.

Multiple Outlet Provides for Variable Sewage Flow. Regulation and distribution of sewage discharge through seven outlets into Calumet-Sag canal. By S. T. Smetters, ass't bridge engr., sanitary dist. of Chicago. 4 ills., 1,000 words. Engineering News-Record, Oct. 16, New York.

Heavy Rain Destroys Sewer and Railway at St. Louis. City delayed taking engineer's advice after earlier damage; about 4 inches of rain in 2½ hours. By W. W. Horner, chf. engr., sewers and paving, St. Louis, Mo. 2 ills., 700 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

**Sewage Pumping:**

Underground Sewage Pumping Plant. Circular station entirely underground being constructed at Walkerville, Ont. From description in recent edition of "Canadian Engineer." 2 ills., 500 words. Engineering and Contracting, Nov. 12, Chicago.

Sewage Pumping in Business District. 1 ill., 200 words. Municipal Journal and Public Works, Nov. 1, New York.

**Sewage Treatment:**

Economic Values in Sewage and Sewage Sludge. Great difficulties incident to recovery of grease and fertilizer from sewage, and possibilities of attaining that end by modification of Cobwell process of garbage treatment. From paper before American Society of Municipal Improvements, by Raymond Wells, chemist and technologist, Homer, N. Y. 5,500 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

House Refuse Used for Sewage Filters. Remarkable success obtained at Leek. Letter to editor from W. E. Beacham, engr. and surveyor, Leek. 800 words. Editorial reference, 700 words. Municipal Engineering and Sanitary Record, Nov. 6, London, England.

The Problem of Sewage Disposal at Shanghai, India. The activated sludge process; temperature effects; an exceptional sewage. From preliminary report

(*Continued on page* 35.)

Berks Co., 14,260 ft. one course reinf. concr. pavement, Cotton & Corson Co., Ocean City, N. J., $132,921.60; Bennett & Randall, Lebanon, Pa., $105,852.18.

Butler Co., 16.133 ft. one course, reinf. concr. pavement, M. J. Scanlon, New Castle Pa., $221,016.40.

Butler Co., 31,663 ft. one course reinf. concr. pavement, C. E. Walter, Butler, Pa., $316,042.30.

Carbon Co., 23,420 ft. one course reinf. concr. pavement, Osborne Morgan, Wilkes-Barre, Pa., $232,607.28.

Centre Co., 1,720 ft. one course reinf. concr. pavement, Spruks Co., Scranton, Pa., $45,248.24; Frank Murphy, Altoona, Pa., $38,783.98.

Centre Co., 5,326 ft. vit. brick pavement, Leo. E. Kelly, Brooklyn, N. Y., $154,878.45.

Chester Co., 11,523 ft. one course reinf. concr. pavement, Henry E. Baton, Philadelphia, Pa., $99,281.89; Michael Staub, Hammonton, N. J., $113,191.61; Winston & Co., Pottstown, Pa., $94,892.40.

Clearfield Co., 39,911 ft. one course reinf. concr. pavement, Warren Bros. Co., Boston, Mass., $415,450.90; A.: L. Anderson & Bros., Inc., Altoona, Pa., $501,776.10.

Delaware Co., 10,700 ft, one course reinf. concr. pavement, Sutton & Corson Co., Ocean City, N. J., $92,829.10; Michael Staub, Hammonton, N. J., $104,855.22.

Elk Co., 3,169 ft. one course reinf. concr. pavement, Fish, Young & Parks, Philadelphia, Pa., $47,261.85; C. A. McDonald, DuBois, Pa., $42,620.83.

Elk Co., 7,543 ft. one course reinf. concrete pavement, Miller Constn. Co., Punxsutawney, Pa.. $95,964.35.

Elk Co., 25,563 ft. one course reinf. concrete pavement, Warren Bros. Co., Boston, Mass., $85,721.15.

Erie Co., 10,600 ft. one course reinf. concr. pavement, Henry Shenk Co., Erie, Pa., $93,560.75; Chas. H. Fry Constn. Co., Erie, Pa., $70,527.43.

Erie Co., 21,268 ft. one course reinf. concr. pavement, Chas. H. Fry Constn. Co., Erie, Pa., $164,270.31; Henry Shenk Co., Erie, Pa., $183,779.64.

Erie Co., 21,109 ft. one course reinf. concr. pavement, Summit Constn. Co., Akron, O., $193,399.14.

Fayette Co., 960 ft. one course reinf. concr. pavement, Lawrence Schultz & Son, Fredonia, N. Y., $14,751.75; Petriello Bros., South Brownsville, Pa., $16,065.

Fayette Co., 5,475 ft. reinf. concr. pavement, Petriello Bros. & Co., South Brownsville, Pa., $15,065.

Fayette Co., 5,475 ft. reinf. concr. pavement, Petriello Bros & Co., South Brownsville, Pa., $66,072.20.

Fayette Co., 4,889 ft. one course reinf. concr. Hillside vit. brick pavement, Petriello Bros. & Co., South Brownsville, Pa., $54,105.60.

Fayette Co., 15.323 ft. one course reinf. concr. Hillside vit. brick pavement, Thos. Arrigo, Charleroi, Pa., $161,608.30.

Greene Co., 12,581 ft. one course reinf. concr. pavement, E. E. Morris and T. Riley Huffman, Waynesburg, Pa., $201,444.15.

Lawrence Co., 14,611 ft. one course reinf. concr. pavement, Aronberg & McDonald, New Castle, Pa., $135,000.40; Foster Waring Constn. Co., Pittsburgh, Pa., $159,463.50.

Lawrence Co., 11,625 ft. one course reinf. concr. pavement, M. J. Scanlon, New Castle, Pa., $124.956.97; Burns Bros., New Castle Pa., $134,484.10.

Montgomery Co., 8,598 ft. either bituminous surface course on concr. foundation or one course reinf. concr. pavement, Fish Rutherford, Inc., Philadelphia. Pa., $73,007.98; Michael Staub, Hammonton, N. J., $89,357.60.

Northampton Co., 15,000 ft. one course reinf. concr. pavement, Smith, McCormick Co. & McInerey & McNeal, Inc., Easton, Pa., $165,523.20; Trinidad Asphalt Paving Co., Larksville, Pa., $225,026.50.

Northumberland Co., 31,200 ft. one course reinf. concr. pavement, H. B. Sprout Constn. Co.. Inc., Scranton, Pa., $272.559.50; Arthur McMullen Co., Philadelphia. Pa., $231,883.20.

Northumberland Co., 18,140 ft. one course reinf. concr. pavement, Fiss & Christiano, Shamokin, Pa., $171,630.90; Mason & Hanger Co., Inc., Poxinos, Pa., $173,707.36.

Potter Co., 8,358 ft. either bituminous surface course on concr. foundation or one course reinf. concr. pavement, Chenango Constn. Co., Syracuse, N. Y., $89,894.02; Geo. Metzger, Jr., Emporium, Pa., $99,020.67.

Somerset Co., 6,900 ft. one course reinf. concr. pavement, Frank H Zeigler, Somerset, Pa., $48,447.70; C. J. Newman, L. A. Myers, C. A. Way & H. W. Way, Boswell, Pa., $70,033.55; J. Franklin Norris, Somerset, Pa., $53,397.98.

Susquehanna Co., 3,844 ft. one course reinf. concr. and Hillside vit. brick pavement, Michael Barber, Binghampton, N. Y., $38,352.20; O. B. S. Co., Philadelphia, Pa., $59,619.50.

Tioga Co., 6,280 ft. one course reinf. concr. pavement, John C. Bradley & Co., Wellsboro, Pa., $80,037.46; R. J. DeLong, Williamsport, Pa., $78,017.20.

Warren Co., 2,080 ft. one course reinf. concr. pavement, James P. Morrissey, Dunkirk, N. Y., $39,656.50..

Westmoreland Co., 9,184 ft. one course reinf. concr. Hillside vit. brick pavement, McCrady Bros. Co., Braddock, Pa., $138,195.35.

Westmoreland Co., 32,047 ft. one course reinf. concr. and Hillside vit. brick pavement, McCrady Bros. Co., Braddock, Pa., $13,866.50; Langthorn Co., Inc., New York City, $478,204.78.

Westmoreland Co., 57,588 ft. on ecourse reinf. concr. and Hillside vit. brick pavement, Warren Bros. Co., Boston, Mass., $868,985.87.

***S. C., Greenwood**—Contract for Callison Rd., 11.1 mi. long, Greenwood Co., awarded W. N. Thompson, Chester, at $51,500.

***Tex., Clarendon**—City Comn. awarded contract for 18 additional blocks of brick paving through residential section of city to Panhandle Constn. Co.

***Wash., Olympia**—Contract for grading 6 mi. of Inland Empire Highway in Columbia Co. awarded G. L. Stickler, Asotin, $95,184; grading and surfacing 10 mi. Garfield Co., General Construction Co., Spokane, at $184,002; paving 10 mi. in Walla Walla and Franklin Counties, to W. J. Smith, Ritzville, at $72,614. Contract for 2 mi. road Chelan Co. awarded Rajotte, Forbet & Winters, 514 Ziegler Bldg., Spokane, $78,535; grading 1.5 mi. of road leading south from Keller, to Root & Joslin, Monroe St., Spokane, at $21,491.

***Wis., Menomonie**—Following road contracts were let to Herman Schroetter, Jim Falls, Wis.: Colfax-Sand Creek Rd., grading and gravel surfacing, $2,168; Wheeler-Prairie Farm Rd., grading and clay surfacing, $1,590; Menomonie-Colfax Rd., grading and culverts, $916. All Dunn Co. Frank Stewart, Menomonie, Wis., Comr.

***Wis., Rhinelander** — Contract for building Eagle River Rd., in Oneida Co., was let to Ben Williams, McNaughton, Wis., for $5,761.50.

## SEWERAGE AND SANITATION

**Ga., Leslie**—Election ordered upon issuance of municipal bonds for constructing sewers and water works system. F. A. Wilson, Mayor.

**Ill., Decatur**—City plans election in January to vote $800,000 bonds to build 14,000 ft. intercepting sewers, various sizes. S. A. Greeley, 39 West Adams St., Chicago, Engr.

**Ill., East Moline**—City plans to build 10,000 ft. 36-84-in. sewers in various streets; $230,000. W. L. Warnes, City Engr.

**Ill., Burr Oak**—City contemplates construction of sanitary sewer costing $75,000. E. A. Rossiter, Clark St., Chicago.

**Kans., Topeka**—Five-ft. sewer has been proposed by city engineer as temporary expedient for solution of South Topeka drainage problem.

**La., Monroe**—City Council voted for improvements and plans are being made for 27 mi. house sewers, 8 to 42 in. diameter, system of drainage sewers 15 in. to 42 in. diameter; cost, $490,000.

**Md., Baltimore**—Highway Engineer Weighardt submitted estimate for providing new territory as well as unsewered parts of city with system of sanitary sewers and storm water drains, $30,000,000.

**Mich., Grand Rapids**—Bids received by city clerk until Jan. 5 on $10,000 sewer construction bonds. J. C. Shinkman, city clerk.

**Mich., Saginaw**—City having plans prepared for sewers in several streets; $30,000. H. H. Eymer, Engr.

**Minn., Benson**—Plans being drawn for sanitary and storm sewers; cost, $60,000. Bradley Engineering Co., St. Cloud, Minn.

**Minn., Duluth**—City comrs. receive petition to build sewer system in Norton Fairmont Park. J. A. Farrell, comr.

**Neb., Loup City**—City passed resolution to construct sewers in Dist. No. 1; estimate, $75,000.

**N. Y., Rochester**—City passed ordinance providing sewers in Hillside Ave., Edgar St. and Bengal Terrace at cost $80,000; also for outlet sewers in Maple and Field Sts., at cost $50,800.

**N. D., Kenmare**—City plans to install storm sewer system. Estimate $15,000.

**O., Oakwood**—Engr. R. G. Allen of Dayton is making plans for sanitary sewers; total cost $200,000.

**Utah, Bingham**—Box Elder Co. Comrs. appointed Engineer B. McBride, Logan, to prepare plans for draining Bear River. Estimate, $100,000.

**W. Va., Clarkburg**—Plans being prepared for storm drainage and 5 bridges for city at total cost $115,000. John C. Craddock, Mayor.

**Wis., Kohler**—City having surveys made for sanitary sewerage system; $75,000. J. Donohue, York Bldg., Sheboygan, Engr.

**Ont., Belleville**—City having plans prepared and soon receives bids building 5,000 ft. 10-15-in. vitr. sewers in Dufferin Ave.; $125,000. J. G. McGill, City Engr.

**Que., Three Rivers**—Council plans construction of sewers at cost $75,000. Engineer, Z. St. Lambert.

### BID SRECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

***Wash., Seattle**—Bd. of Public Works awarded following contract: 63d Ave., S. W., et al, by trunk sewer, etc., to Sweeney & Gallucci, Tacoma, on bid $170,793.80 for alternate segmental block and clay pipe sewer.

## WATER SUPPLY

**Cal., San Francisco**—J. S. Dunnigan, Clerk of Bd. of Supervisors, will receive bids until Jan. 5 for $29,220,000 water bonds.

**Colo., Veno**—Will vote Jan. on $26,000 water bonds.

**Colo., Colorado Springs**—Comrs. of El Paso. Co. will expend $16,000 in laying new pipe lines, repairing a reservoir and improving water system at county farm.

**Ill., Decatur**—City receives bids in January building concrete and earth impounding dam, 1,900 ft. long, 28½ ft. high at spillway; $500,000. S. A. Greeley, 39 W. Adams St., Chicago, Engr.

**Ill., Jacksonville**—City Clerk receives bids January building filtration plant, 1,500,000 gal. capacity; $50,000. S. A. Greeley, 39 W. Adams St., Chicago, Engr.

**Ind., Michigan City**—City plans to build water works plant; $150,000. C. Brossman, 1603 Merchants Bank Bldg., Indianaopolis, Engr.

**Mich., Ironwood**—City election in January to vote on bonds to build new water works system at Spring Creek. Plans include 3 electrically and 2 auxiliary gasoline driven centrifugal pumps. Estimated cost $435,000.

**Mich., Pontiac**—City plans election in April to vote on bonds to build filter plant, 10,000,000 gal. daily capacity. C W. Hubbell, 2348 Penobscot Bldg., Detroit, Engr.

**Mont., Great Falls**—City voted $225,000 bonds to improve water works system. L. B. Evenson, City Engr.

**N. J., Asbury Park**—Water Supt. Robt. Bartley, Jr., has prepared plans for installation of new equipment at city water station, including system of oil burning engines. Cost, $112,000.

**N. J., Newark**—Contracts for building main dam for Wanaque water shed will be let in short time, according to Chief Engineer Sherrerd.

**N. Y., Watervliet**—City Chamberlain Chas F. Polk will receive bids until Dec. 30 for $50,000 water bonds.

## The Municipal Index

by C. H. Godfrey, municipal engr. 3,200 words. Water and Water Engineering, Nov. 20, London, England.

Capacities of Small Septic Tanks. Few data available for designing sizes; standards of capacities fixed by North Carolina Board of Health. By S. E. Peters. 1,300 words. Municipal Journal and Public Works, Nov. 22, New York.

Agreement Reached for Packing-Town Sewage Disposal. Activated-sludge sewage treatment plant for stock yards. 1,600 words. Engineering World, Nov. 1, Chicago.

Preventing River Pollution from Albany Sewage. New sewage disposal works constructed before the war are now in operation. By F. R. Lanagan, city engr., Albany, N. Y. 3 ills., 1,000 words. American City, November, New York.

Disinfection of Sewage. Results obtained at Millville and at Camp Merritt by the use of chlorine gas; tests made by State Department of Health. From "The Cornell Civil Engineer" for October, somewhat condensed, by C. G. Wigley, Wallace & Tiernan Co. 2 tables, 1,400 words. Municipal Journal and Public Works, Nov. 15, New York.

Sewage Treatment Report Forms and Testing Apparatus. Monthly blank sheet for daily test records and apparatus for finding settleable solids and sludge depths. By E. J. Tully, chemist, State Board of Health, and J. H. Mackin, operating engr., Madison Sewage Works. 3 ills., 1,000 words. Engineering News-Records, Oct. 30-Nov. 6, New York.

Experiments to Adapt Cobwell Process to Handling Sewage Sludge. Abstract of paper by Raymond Wells, consltg. chemist, Homer, N. Y., before American Society for Municipal Improvements. 1,500 words. Engineering and Contracting, Nov. 12, Chicago.

Economic Values in Sewage Sludge. No net return probable unless ammonia exceeds three per cent; decreasing market value of products. 3,800 words. Municipal Journal and Public Works, Nov. 8, New York.

Testing Discharge of Sprinkling Filter Nozzles. By W. E. Weller, city engr., Binghamton, N. Y. 6 ills., 600 words. Municipal and County Engineering, November, Indianapolis, Ind.

Washing Sewage-Filter Gravel at Clinton, Mass. Dirty material moved to washer by drag scoops and hauled back by same means; cost $11.75 per cubic yard. 700 words. Engineering News-Record, Oct. 23, New York.

Millions in Sewage and Garbage. Editorial. 150 words. Municipal Journal and Public Works, Nov. 1, New York.

The Activated Sludge Plants at Manchester, Eng. Editorial. 500 words. Municipal Engineering and Sanitary Record, Nov. 13, London, England.

Diagram Adaptation of the Rational Method of Storm-Water Drain Design. Review of maps, population estimates, rainfall intensities, probability charts and various instruments and methods associated with storm-sewer design, and illustration of how diagram is used. By H. G. McGee, hydraulic and sanitary engineer, Des Moines, Ia. 7 ills., 5 tables, 3,200 words. Engineering News-Record, Nov. 13-20, New York.

The New Sewage Treatment Plant at Montezuma, Ia. Notes from article by J. H. Dunlap, asso. prof. of hydraulics and sanitary engrg., State University of Iowa, in recent issue of "Transit." 500 words. Engineering and Contracting, Nov. 12, Chicago.

Sewage Treatment Plant at Montezuma. Relation to design of plant to funds available; unit costs to date. By J. H. Dunlap, asso. prof. hydraulic and sanitary engrg., State University, Iowa City, Ia. 6 ills., 5,000 words. Municipal and County Engineering, November, Indianapolis, Ind.

Treatment of Gas Waste to Prevent Water Pollution. Tar and oil separators, aerators and chemical treatment in some cases, coke contact and fine gravel-sand beds. By E. J. Tully, chemist, State Board of Health, Madison, Wis. 2 ills., 900 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

**Sanitation:**

Various Current Phases of Sanitary Engineering. Brief abstracts of papers, reports and resulting discussions at the New Orleans meeting of the American Public Health Association. 2,700 words. Engineering News-Record, Nov. 13-20, New York.

Restoring Sanitation in Palestine. Early hydraulic engineering in Palestine; new water supplies; abolishing malaria. By H. Y. Carson, formerly capt. and sanitary engr., Red Cross Comn. to Palestine. 3 ills., 2,000 words. American City, October, New York.

Sanitation and Municipal Death Rates. Beginning of municipal sanitation; technical advice essential; health should determine appropriation. From paper before Pan-American Commercial Conference, by G. A. Soper, maj., Sanitary Corps, U. S. A. 1,800 words. Canadian Engineer, Nov. 20, Toronto, Can.

Result of Malaria Mosquito Survey in Northern California. 400 words. Engineering and Contracting, Nov. 12, Chicago.

### WATER SUPPLY.

**Pumping:**

Air Lift Pumping. The individuality of wells; should avoid large bubbles; misleading results. Paper before Iowa section of American Water Works Ass'n, by Charles J. Deem, hydro-pneumatic engr., Harris Air Pump Co., Chicago. 3,500 words. Canadian Engineer, Nov. 6, Toronto, Can. 5,500 words. Municipal and County Engineering, November, Indianapolis, Ind.

Pumping Water for Irrigation Makes Important Power Load. By W. A. Scott. 1,000 words. Engineering World, Nov. 1, Chicago.

Electric Well Pumping in Savannah. 200 words. Municipal Journal and Public Works, Nov. 1, New York.

Starting Work on World's Largest Pumping Station. Estimated cost of Chicago's tunnel is $3,500,000. 2,000 words. Engineering World, Nov. 15, Chicago.

Belleville, Ont., Water Supply. New electric pumps installed; comparison of cost of pumping for 1916 and 1919. 1 ill., 800 words. Canadian Engineer, Nov. 6, Toronto, Can.

**Mains:**

An Experience with a Broken 24-Inch Water Main. Paper before Iowa section of American Water Works Ass'n, by S. L. McEntyre, supt., Council Bluffs, Ia., city water works. 800 words. Canadian Engineer, Nov. 6, Toronto, Can.

Willow Root, 24 Feet Long, Is Taken from a 10-Inch Wooden Water Main. 1 ill., 350 words. American City, November, New York.

Reinforced Concrete Pipe Made by Centrifugal Process. Cylindrical form is placed around wire-covered mandrel, concrete is poured and whole rig spun until concrete sets. By E. M. Weston, Union Club, Johannesburg, South Africa. 1 ill., 700 words. Engineering News-Record, Oct. 9, New York.

**Water Supplies:**

Watershed Leakage in Relation in Gravity Water Supplies. By R. E. Horton, consltg. hydraulic engr., Voorheesville, N. Y. Abstract of paper before New England Water Works Ass'n. 1,000 words. Engineering News-Record, Oct. 30-Nov. 6, New York.

Schoharie Development Involves Dam and 18-Mile Tunnel. Abstract of paper before New England Water Works Ass'n, by J. Waldo Smith, chf. engr., bd. water supply, N. Y. C. 3 ills., 400 words. Engineering News-Record, Oct. 30-Nov. 6, New York.

Determination of Water Supply from Snow Fields. Important for irrigation and hydraulic works; snow sampler measurements and tables based on extended investigations made in the Sierra Nevada mountains. 1 ill., 2 tables, 1,500 words. Engineering News-Record, Oct. 23, New York.

Shandaken Water Supply Tunnel Job Will Require 2,000 Men for Five Years. 1 ill., 800 words. Engineering and Contracting, Nov. 12, Chicago.

Development and Storage of Water for Electrical Purposes. Canals and open channels; forebay reservoirs; pressure pipes; tail races. Abstract of paper before Institution of Electrical Engineers, by J. W. Meares. (Continued.) 4 ills., 4,000 words. Water and Water Engineering, Nov. 20, London, England.

**Water Purification.**

Upkeep Problems at St. Louis Filtration Plant. Data on sand growth; removal of mud balls; loose strainer plates; chemical action on equipment; care of hydraulic valves. 2,400 words. Engineering News-Record, Nov. 27-Dec.4, New York.

Reduced Lime Feed Saves Money and Lessens Deposits. Grand Rapids plant now lets hardness rise to Lake Michigan softness, reducing help, wash water and chemicals. 1 chart, 1,000 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

Toronto Drifting Sand Filter Results. Abstract of paper before New England Water Works Ass'n, by N. J. Howard, bacteriologist in charge, water-filtration plant laboratory, Toronto. 2 ills., 1,000 words. Engineering News-Record, Oct. 30-Nov. 6. News York.

Water Filtration in the Tropics. Compilation of records of a slow?sand filtration plant located on one of the Hawaii islands. By S. W. Tay, sanitary engr., Territorial Board of Health, Hawaii. 400 words. Municipal Journal and Public Works, Nov. 8, New York.

Sanitary Effect of aWter Storage in Open Resevoirs. Studies of chemical and bacterial characteristics of water on entering and leaving two reservoirs in Maryland. By A. Wolman and S. T. Powell, of Mryland State Dept. of Health and Baltimore County Water and Electric Co., respectively. 2 ills., 2,000 words. Engineerings News-Record, Oct. 30-Nov. 6,.New York.

Prevention and Cure of "Red Water." Effected by removal of oxygen from water; use for this purpose of deactivator and filter. By Wm. H. Walker. Paper before N. E. Water Works Ass'n. 1,000 words. Municipal Journal and Public Works, Nov. 22, New York.

**Metering:**

Meters Cut Water Consumption of City in Irrigated District. By C. E. Panter, with Tibbets & Pleasant, contractors, Okmulgee, Okla. 1 ill., 600 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

What Meterage Has Done for a New England City. Middletown, Conn., has reduced water consumption from 133 gallons per capita to 78 gallons. 2,000 words. Engineering and Contracting, Nov. 12, Chicago.

Philadelphia Fights Water Waste. Third of series of articles telling of successful campaign on broad lines; Pitot tube most valuable as means of measuring pump discharge; high velocity measurements most difficult; data must be used to be of value. By W. M. Crowe, ass't engr., Philadelphia Bureau of Water. 7 ills., 3,500 words. Fire and Water Engineering, Nov., New York.

**Reservoirs and Standpipes:**

New 10,000 Gallon Flat Slab Roof Concrete Reservoir at Dayton, O. 2,200 words. Engineering and Contracting, Nov. 12, Chicago.

Structural Features and Erection Methods for 258 Feet High Steel Tower and Tank. 800 words. Engineering and Contracting, Nov. 12, Chicago.

Protecting Standpipes from Corrosion. Editorial reference to paper by C. W. Sherman, at American Water Works Ass'n. 1,000 words. Engineering World, Nov. 1, Chicago.

Painting Iron and Steel Standpipes. Conclusion of author from data collected from cities all over country and from personal experience; thorough cleaning and immediate painting with red lead recommended. By C. W. Sherman, of Metcalf & Eddy. Paper before N. E. Water Works Ass'n. 2,500 words. Editorial, 100 words. Municipal Journal and Public Works, Nov. 1, New York.

Painting Iron and Steel Standpipes. Information from all sections of the country; kind, amount and cost of paint used; preparatory treatment; results. 2 pages tables, 300 words, Nov. 15.

Effect of Water Uplift on Overturning of Dams. Theory advanced that water pressure acting upward replaces portion of foundation reaction and that its overturning effect is annulled by counter movement produced by "remaining foundation reaction"; effect of uplift upon sliding. By E. Maerker, formerly structural engr., Toronto Power Co. 6 ills., 1,000 words. Canadian Engineer, Nov. 6, Toronto, Can.

Measurement of Pressures in Core of Hydraulic Fill Dam. 1 ill., 600 words. Engineering and Contracting, Nov. 19, Chicago.

Summary of Reports on Painting the Interior Surfaces of Standpipes: Continued from Nov. 1 issue. 1½ pages table, 150 words. Municipal Journal and Public Works, Nov. 22, New York.

(*Continued on page* 37)

**N. Y. (L. I.), Huntington**—Engineer Harold Stevens presented tentative reprot on proposed municipal water plant. It is proposed to build large stand-pipe on high ground at Huntington Station and to utilize present plant as far as possible. Cost of proposed plant $400,000.

**N. C., Snow Hill**—City will receive bids until Jan. 20 for $60,000 water and sewer bonds.

**N. C., Mars Hill**—Following decision to erect 150,000-gal. reinf. concr. reservoir in connection with modern water supply system, Mayor J. B. Huff and members of Bd. of Aldermen have purchased supply of piping.

**N. D., Fessenden**—City plans to build well system and mains in various streets. $50,000.

**Okla., Foraker**—City voted $40,000 bonds to improve water works system. Engineer not selected.

**O., Xenia**—Council passed ordinance to issue bonds of $325,000 for purchase and extension of water works system.

**O., Greenville**—Jan. 15 has been fixed as date for bond issue of $135,000 for improvement of water system.

**O., Middlefield**—City contemplates construction of water works and pipe line; cost, $30,000. E. Reed, Clerk.

**O., Portsmouth**—City plans to extend water mains; $30,000. L. A. Zucker, City Auditor.

**Ore., Reedsport**—City plans construction of municipal water system.

**Pa., Bethlehem**—City authorizes bond issue of $1,700,000 for water works construction.

**Tex., Wichita Falls**—Wichita County Water Impvt. Dist. No. 1 will invest $2,750,000 in water system which, will irrigate 100,000 acres in Wichita and Archer Counties. Vernon L. Sullivan, El Paso, Tex., Consulting Engr.

**Wash., Walla Walla**—Fred G. Wills, City Clerk, informs that election Dec. 16 was carried in favor of issuing $500,000 water system bonds.

**W. Va., Clarksburg**—J. M. Craddock, Mayor, states that plans are being prepared by Engineers Herriot & McClintock, 170 Broadway, New York, for water works; cost $300,000.

**Wis., Kohler**—City having preliminary surveys made for water works system; $50,000. J. Donohue, York Bldg., Sheboygan, Engr.

**Wis., Cedarburg**—City plans to build water works system; $75,000. T. Bechley, Aud.

## LIGHTING AND POWER

**Ia., Ferguson**—Voters authorized purchase electrical equipment and approved issue of $300,000 bonds.

**Ia., Maquoketa**—Sealed proposals will be received by D. T. Bauman, City Clerk, until Jan. 20, for purchase of $65,000 electric light bonds.

**Mich., Arcadia**—Village will have electricity; $20,000 circuit will be constructed from Benzie Power Co. on Benzie River.

**N. Y., Churchville**—City contemplates electric lighting and power system and voted on bonds of $25,000 for construction.

**O., Hamilton**—Council passed ordinance for $50,000 bonds for improvement and development of city ilght plant and distribution system. F. J. J. Sloat, Service Dir.

**Ore., Bakersfield**—The Kern Delta Irrigation Dist. plans construction of $15,000 power plant at Isabella.

**S. D., McIntosh**—Voters of McIntosh approved proposition for municipal light plant at special election. Plant will be built in spring.

**Va., Norfolk**—Virginia Railway & Power Co. will spend $1,300,000 during 1920 on improvements to street car and lighting facilities.

**B. C., Vancouver**—British Columbia Electric Ry. Co. plans extension to gas plant; cost $150,000.

**Ont., London**—General Manager Buchanan, of Public Utilities Comn., stated that commission stands ready to build supplementary electric power plant the moment city begins new dam across the river. Dam could be erected for $150,000, and it would cost another $100,000 to install power generating plant.

**Ont., Fort Metachewan**—British syndicate plans power development plant; cost, $250,000. Engineers, Sutcliffe & Neelands, New Liskeard, Ont.

## FIRE

**Cal., Santa Ana**—Fire chief petitioned for new fire house, fire engine and other fire apparatus.

**La., Bogalusa**—Bond issue of $15,000 has been authorized for fire alarm system. Address City Clerk.

**Ia., Decorah**—City Council is figuring strongly on purchasing combination fire truck, consisting of hose, ladder and chemical.

**Mich., Battle Creek**—City may buy new fire alarm telegraph system costing $20,000.

**N. J., Cloverdale**—Fire Dept. has just been organized and is trying to raise funds for building and equipment. Address Secetary.

**O., Hillsboro**—Bond election Jan. 27 to submit issue of $9,000 for purchase of new fire truck.

**O., Hillsboro**—Fire equipment com. of council will make recommendation concerning purchase of new equipment for fire dept.

**Pa., Bethlehem**—Bond issue of $65,000 for extension and improvement of fire alarm telegraph system and police telephone and signal system is authorized.

**Pa., Lewiston**—Council proposes to purchase 6 hose carriers, 6 spanners and 500 ft. new fire hose. Address Clerk of Council.

**R. I., Woonsocket**—Appropriation of $24,000 asked for purchase of motor aerial truck and combination pumper. Address chief of dept.

**Wash., Seattle**—City Architect Daniel Huntington completed plans for fire station No. 31, a two-story fireproof building. It is proposed to build strucure 48x27 ft. in area; cost, $20,000.

**W. Va., Newell**—Council has authorized purchase of 5,000 ft. fire hose to increase efficiency of local dept. It was also decided to repair fire truck.

**W. Va., Wheeling**—City Manager Chas. O. Epstein has made inspection of fire apparatus in suburban towns and will shortly make report on requirements of these depts.

**Wyo., Cheyenne**—It was decided to call for bids for new truck to replace one smashed several weeks ago.

### BIDS RECEIVED AND CONTRACTS AWARDED.

**Pa., Harrisburg**—Following bids received by State Hwy. Dept.: Armstrong Co., fabrication and erection complete of superstructure for one deck plate girder hwy. bridge, G. W. Ensign, Inc., Harrisburg, Pa., $12,492.69; Farris Engineering Co., Pittsburgh. Pa., $9,877.57. Berks Co., fabrication and erection complate of through plate girder highway bridge, The O. B. S. Co., Philadelphia, Pa., $31,157.04; The U. G. I. Cont'g Co., Philadelphia, Pa., $41,197.65. Bucks Co., erection complete one through plated girder highway bridge, The C. B. S. Co., Philadelphia, Pa., $24,377,17; G. W. Ensign, Inc., Harrisburg, Pa., $33,665.65. Bucks Co., erection complete of one through plate girder highway bridge, C. B. S. Co., Philadelphia, Pa., $28,560.90; G. F. Ensign, Inc., Harrisburg, Pa., $3,166.80.

## BRIDGES

**Cal., Chico**—Concrete bridge planned over Edgar Slough on Lone Pine Ave. Address M. C. Polk, Co. Rd. Engr. of Butte Co., Oroville.

**Cal., Colusa**—Bridge over Sacramento River, between Colusa and Glenn Cos., contemplated. Address Co. Clerk.

**Man., Headingly**—If project is approved by municipalities interested, a $36,000 bridge will be built over Assiniboine River next summer. Structure will be of concrete and wood.

**Man., Morris**—Engineers are making plans and specifications for bridge across Red River. Cost, $100,000. Provincial Hwy. Comr., A. McGillivray, Parliament Bldgs., Winnipeg.

**Mo., Webb City**—Special election on bonds for construction of bridges in Jasper Co. will be ordered soon by County Court. Issue will be $250,000.

**N. J., Elizabeth**—Within a few weeks plans for proposed new bridge over Elizabeth River at South Front St. will be in hands of Co. Engr. Bauer and will be submitted to contractors for bids. Plans being prepared by Haskell Bridge Co., of Philadelphia. Estimated cost, $200,000, covered by a county bond issue.

**N. C., Forrest City**—City plans to install sewerage system; $25,000. J. B. McCrary Co., Atlanta, Ga., Engrs.

**N. C., Wadesboro City**—City plans to install sewerage system; $35,000. Blair & Drane, Charlotte, Engrs.

**Okla., Oklahoma**—State Bd. Health ordered city to build sewage disposal plant; $1,000,000. J. W. Bennett, City Engr.

**Okla., Miami**—Bridge will be constructed across Neosho River; also other bridges will be improved. Cost, $55,000. George Stein, supervising engr.

**O., Youngstown**—Cost of Belmont Ave. bridge estimate at $275,000. Ordinance for construction is pending.

**Ore., Vale**—Malheur Co. and State Hwy. Comn., Portland, having preliminary plans prepared by H. Nunn, State Hwy. Engr., Salem, building bridge over Malheur River.

**Pa., Bethlehem**—Bond issue of $405,000 for construction of viaduct is authorized.

**Pa., Williamsport**—Issue of $500,000 bridge bonds voted in Lycoming Co. Address Co. Comptroller.

**Va., Petersburg**—Engineers of Norfolk and Western and Atlantic Coast Line Railway completed survey for overhead bridge in city. Cost, $350,000.

**S. C., Converse**—It is planned to spend $45,000 for concr. bridge over Pocolet River. Address J. R. Pennell, State Hwy. Engr., Columbia.

**Tex., Orange**—Chamber of Commerce ask that sum of $250,000 be set aside to construct proposed steel and concrete bridge across Sabine River at this place.

**W. Va., Charleston**—City contemplates construction of bridge to cost $300,000. P. J. Walsh, Engr.

**Wis., Shawano**—Plans being prepared by State Hwy. Comn. for 12 bridges in Shawano Co. W. F. Meyer, Shawano, Co. Hwy. Comr.

**Wis., Madison**—Wisconsin highway comn. have made surveys and plans for following county aid bridges: Town of Sugar Creek, Brewster bridge, 20x24 ft., reinforced concrete span, with concrete abutments; H. J. Peters, Elkhorn, comr. Town of Parkland, Dutchman's Creek bridge, 16x20 ft., reinforced concrete span, concrete abutments; C. J. Morisset, Superior, Wis., comr. Marquette Co., Meinke bridge, 16x24 ft., reinforced concrete span, concrete abutments; Levi Jones, Endeavor, Wis., comr. Town of Springfield, the Gable bridge, 16x24 ft., reinforced concrete span, concrete abutments; Levi Jones, Endeavor, Wis., comr. Sheboygan Co., 9 reinforced concrete bridges; K. W. Ubbelohde, Sheboygan, comr.

**Alta., Banff**—Bridge to be erected over Bow River, for which Dominion Govt. has called for tenders, will be reinf. concrete at cost $160,000.

## MISCELLANEOUS

**Ark., Little Rock**—Pulaski Heights property owners will petition City Council to organize new improvement district; cost $40,000.

**Conn., Bridgeport**—Plans being prepared by J. A. McElroy, City Engr., for concr. bridge over Cedar Creek. Cost, $10,000.

**Fla., Pensacola**—Passoge of ordinance authorizing issuance of dock and belt line bonds for $400,000 insure dock and

# The Municipal Index

**Miscellaneous:**

A Page from Recent Water Works Reports. Frost penetration in New England in 1917-18. Grouting foundations for dam. How Middletown, Conn., handled frozen meter problem. Thawing fire hydrants with exhaust from truck; borings to determine condition of embankment at Ashokan. Value of soap saved more than cost of water softening in St. Louis. 1,600 words. Engineering and Contracting, Nov. 12, Chicago.

British Water Works Association. 8th annual general meeting held at offices of Metropolitan Water Board, London. 2,300 words. Water and Water Engineering, Nov. 20, London, England.

Pumping Station Undermined by Leaks and Shut Down. Stiff clay honeycombed by rush of water under low head; simple repairs with sheet piles enable early resumption. 3 ills., 600 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

New Water Works System for Phoenix, Ariz. Supply of soft water to be brought a distance of 33 miles and will cost $1,300,000. 700 words. American City, October, New York.

Water Supply Supervision. New York Department of Health by establishing an engineering division has reduced typhoid mortality. Paper before N. E. Water Works Ass'n, by T. Horton, ch. engr., N. Y. State Dept. of Health. 1 ill., 2,300 words. Engineering World, Nov. 15, Chicago.

Water Works for a Small Village. Place of 500 population has spring water pumped to water tank, fire protection and sewerage system. 4 ills., 600 words. Municipal Journal and Public Works, Nov. 1, New York.

Concrete in Water Works Construction. Multiple arch dams; buttress and slab type; reservoirs; concrete pressure pipe; frictional loss in concrete pipe; tanks and standpipes. By A. C. Irwin, engr., Structural Bureau, Portland Cement Ass'n, Chicago. 8 ills., 6,000 words. Municipal and County Engineering, November, Indianapolis, Ind.

Control of New Streets in Relation to Extension of Water Mains. By B. Brewer, ass't engr., State Dept. of Health, Boston, Mass. 1,000 words. Engineering News-Record, Oct. 9, New York.

## LIGHTING AND POWER.

**Street Lighting:**

Modern Systems of Street Lighting Combine Beauty and Utility. By P. Y. Danley. 4 ills., 2,800 words. American City, October, New York.

Unique Lighting System for Saratoga Springs. By A. F. Dickerson. 2 ills., 500 words. American City, November, New York.

Developments in Street Lighting Units. Paper before Convention of Illuminating Engrg. Society, by A. D. Cameron and C. A. B. Halvorson. 2,400 words. Engineering World, Nov. 15, Chicago.

The Principles of Scientific Illumination. From paper at Students' Section of Institution of Electrical Engineers, by G. E. Webb. 350 words. Municipal Engineering and Sanitary Record, Nov. 6, London, Eng.

**Hydro-Electric Power:**

Queenston-Chippawa Development at Niagara Falls, Ontario. The hydro-electric power commission of Ontario is developing the water power of the province. By H. Gardner. 11 ills., 2,700 words. Engineering World, Nov. 1, Chicago.

New Hydroelectric Power Plant at Rio Pangal, Chile. Construction features of diversion dam, seven-mile pipe line, penstocks and waterwheels for new plant built by the Braden Copper Co., to supply power to its works at Sewell, Chile. By H. L. Cooper. 5 ills., 3,000 words. Electrical Review, Nov. 22, Chicago.

Hydro-Electric Power Development at High Falls. Net head of 80 foot utilized at power site on Mississippi river by Hydro-Electric Power Commission of Ontario; details of dam, intake, gate house, pipe line and power house; surface area method of proportioning materials show excellent results in construction of concrete dam. 15 ills., 1,800 words. Canadian Engineer, Nov. 13, Toronto, Can.

Present Limits of Speed and Output of Single-Shaft Turbogenerators. Importance of rotor dimensions; influence of ventilation, temperature, speed and mechanical forces upon capacity. A.I.E.E. paper by F. D. Newbury, Westinghouse Electric & Mfg. Co., 4 ills., 3,300 words. Electrical Review, Nov. 29, Chicago.

Report on Water Powers of British Columbia. Volume of more than 650 pages, by A. V. White, published by Commission of Conservation; thoroughly covers water legislation, meteorological and topographical data, surveys and maps, stream flow data, bench marks, power sites, present and proposed developments, etc. 3 ills., 5,500 words. Canadian Engineer, Nov. 13, Toronto, Can.

**Steam Power:**

Limitations and Performances of Large Steam Turbines. Papers presented before New York meeting A.I.E.E.; salient features given in somewhat abridged form. Present Limits of Speed and Power of Single-Shaft Curtis Turbines, by Erskil Berg, Gen. Electric Co. Present Limits of Speed and Power of Single-Shaft Turbines, by J. F. Johnson, Westinghouse Electric & Manufacturing Co. 6 ills., 6,000 words. Electrical Review, Nov. 22, Chicago.

Pulverized Coal Under Boilers. Relative theoretical performance of stoker-fired and pulverized coal; comparative costs. Abstract of paper by F. A. Scheffler and H. G. Barnhurst. 4 ills., 2 tables, 3,800 words. Electrical Review, Nov. 15, Chicago.

**Rates:**

Central-Station Rates in Theory and Practice. (17th article.) Rates based on demand; flat rates for display lighting and small consumers; advantages of flat rate; theory of rates based on energy and demand. 6,000 words, Nov. 1. (18th article.) Rates based on both energy and demand; time interval of maximum demand, how demand is determined and other details; power-factor; demand measuring instruments. 5,500 words. Nov. 8. (19th article.) Combined energy and demand rates; substitutes for measured demand; encouraging use of appliances; Hopkinson, Doherty and Wright rate systems; combination rates. 7,000 words, Nov. 15. (20th article.) Arithmetical and algebraic analysis of rate schedules; making seemingly involved rates simple; calculations simplified and basic errors exposed. 3,300 words, Nov. 22. (21st article.) Geometrical analysis of rate schedules; principles, of three-dimensional representations of rates; typical examples using solid models. 19 ills., 3,200 words, Nov. 29. By H. E. Eisenmenger. Electrical Review, Chicago.

**Gas:**

Regulation for High and Low Pressure Mains. Experience in regulating pressures from transmission or pumping mains into distribution mains discussed in an A.G.A. paper. By G. T. Macbeth, Mt. Vernon, N. Y., 3 ills., 3,000 words. Gas Age, Nov. 15, New York.

Cast Iron Pipe Joint Tests Made at Schenectady. Results of investigations conducted by Mohawk Edison Co. upon various types of joints for gas mains. By V. Starzenski, Schenectady, N. Y. 21 ills., 1,500 words. Gas Age, Nov. 1, New York.

American Gas Association Annual Meeting. Notes upon proceedings of first annual convention held in Hotel Pennsylvania, N. Y. C., with brief abstract of discussion and speeches at banquet. 2 ills., 13,000 words. Gas Age, Nov. 1, New York.

Fixing of Blame for a Gas Explosion. Legal decisions pointing out whether there is a presumption of negligence where an explosion of gas occurs. By J. Simpson, N. Y. C. 1,800 words. Gas Age, Nov. 15, New York.

**Miscellaneous:**

Value of Statistics in Central-Station Operation. Manifold uses of statistical data; how they should be used; methods of organizing and maintaining the work of compiling essential statistics for the central station. By E. J. Fowler, statistician, Commonwealth Edison Co., Chicago. 3 ills., 2,300 words. Electrical Review, Nov. 22, Chicago.

Discussion of Code Rules on High-Potential Systems. Comments on relation of present rules to developments in field practice, with suggestions for proposed changes. Paper before National Ass'n of Electrical Inspectors, by G. S. Lawler, electrical engr. 2,500 words. Electrical Review, Nov. 15, Chicago.

Illinois State Electric Association Has Profitable Meeting. Central-station representatives at Chicago convention hear and discuss papers on many subjects vital to industry. 2,500 words. Electrical Review, Nov. 1, Chicago.

## FIRE.

Municipal Electric Fire-Alarm and Police Patrol Signaling Systems. 1 ill., 1,500 words. American City, November, New York.

New Sprinkler Fire Alarm. An automatic system for prevention and location of fires in buildings and ships; can also be operated manually through concealed electric element; controls fire doors or curtains; ingeniously designed annunciator. 2 ills., 800 words. Fire and Water Engineering, November, New York.

Private Fire Protection Service. Excerpts from final report of committee on private fire protection service of American Water Works Association; methods to prevent pollution; who should bear cost? (Continued.) 6 ills., 3,800 words. Fire and Water Engineering, November, New York.

New York Fire College Course. Hydraulics in the fire service; friction rules; table of friction losses as set forth by N. Y. Fire Department; formulas for friction loss; to find engine or nozzle pressure; pressure loss in Siamese connections. 4,000 words. Fire and Water Engineering, November, New York.

## STREET CLEANING AND REFUSE DISPOSAL.

Snow Removal Plans and Procedure. As reported by several highway departments in northern states. 3,500 words. Municipal and County Engineering, November, Indianapolis, Ind.

Savings Made by Motorizing Street Cleaning Equipment. At Albany, N. Y., horse sweepers transformed by attaching Ford tractors; truck used with sanding device; power flusher remodeled. 2 ills., 1,000 words. Engineering News-Record, October, New York.

Refuse Dumping at Oakland. 2 ills., 150 words. Municipal Journal and Public Works, Nov. 8, New York.

Pig Feeding for Disposal of Garbage. Results obtained at experimental farm operated by the District of Columbia, and conclusions therefrom; selection of stock; protection from disease; housing and feeding; costs and profits. By F. S. Besson, Capt., Corps of Engrs., U. S. A. 4 ills., 3,400 words. Municipal Journal and Public Works, Nov. 22, New York.

Newark, N. J., Contracts for Garbage Disposal. By new contract city collects and delivers garbage to piggery. By J. W. Costello, engrg. supervisor, Bureau of Street Cleaning and Refuse Collection, Newark. 600 words. American City, October, New York.

Garbage Collection and Disposal at Utica. Pickup made by trucks with trailers; disposal by feeding to hogs and sheep; methods employed; cost of operation. 3 ills., 2 tables, 1,500 words. Engineering News-Record, Oct. 30-Nov. 6, New York.

Recovery of Valuable Constituents of Garbage. Summary of various methods of disposal of municipal wastes, including hog-feeding, incineration, sorting, reduction, alcohol production, etc. Paper before American Society for Municipal Improvements, by S. A. Greeley, consultg. engr., Chicago. 5 tables, 3,500 words. Canadian Engineer, Nov. 27, Toronto, Can.

## CITY PLANNING.

Oregon's New City Planning Laws. By G. C. Moser, state senator, Portland. 700 words. American City, October, New York.

Town Planning, with Special Reference to Ottawa. Planning and production go hand in hand; problems of highway and railway; some notes on present and future problems of capital. By N. Cauchon, consultg. engr. and town planner, Ottawa. 4,000 words. Nov. 13. Dominion park near Ottawa; scenery for railway passengers; reducing the home's overhead; residential and industrial city. 3,000 words, Nov. 20. Canadian Engineer, Toronto, Ont.

The Planning of Land in Relation to Municipal and Social Problems. National and provincial plans; need for topographical maps; regional and town planning. By T. Adams, town planning

*(Continued on page 40.)*

belt railroad and municipal dock. Work to obtain these necessities will proceed rapidly, and plans have already been made.

**Ia., Des Moines**—City soon receives bids for excavation 150,000 yds.; cost $100,000. F. Jeffries, City Clerk.

**Ia., Manchester**—Delaware Co. having lans prepared building 168-ft. reinf. concr. bridge, $40,000. H. Klaus, Co. Engr.

**La., New Orleans**—City nursery, botanical garden and breathing spot will result in purchase of 60 acres on Gentilly Rd. Property was acquired by city parking comn., $40,000. Development of the tract, an area of 1,200 ft., will be begun immediately, according to Col. George McDerby.

**N. Y., Albany**—State land board authorized comptroller to sell $2,500,000 bonds to purchase Mt. Marcy and land surrounding it which is to become a park.

**N. Y., Yonkers**—Ordinance authorizing sum $25,000 for motorization of dept. of pub. works was passed by council. It is purposed to purchase 19 autos.

**Ore., Klamath Falls**—Klamath Irrigation Dist. will be asked to authorize expenditure of $175,000 for construction work.

**Tex., Galveston**—Bids soon to be received for purchase of two motor trucks for health dept.

**Tex., Corpus Christi**—City Comrs. contemplate construction of sea wall, 600 ft. long. Cost, $2,900,000. C. J. Howard, City Engr.

**Wash., Seattle**—K. L. Goulter & Co., Seaview, Wash., who secured state contract for clearing, grubbing and draining six miles of Ocean Beach highway between Bear River and Nasel, Pacific Co., on unit bid amounting to $192,000, wants bids for removal of 150,000 yards of rock and earth.

**Wash., Seattle**—City Council considers $750,000 issue of bonds for purpose of improving city's park, playfield and boulevard system.

**Wis., Shawano**—Shawano Co. appropriated $10,000 for purchase of machinery, including 8 graders. W. F. Meyer, Shawano, Comr. Also Washington Co. Bd. appropriated $13,000 for purchase of road machinery. Chas. Johnson, Kewashum, Wis., Comr..

**Ont., Sarnia**—By-law to raise $35,000 for purchase of asphalt plant and equipment will be submitted to ratepayers at municipal elections. City Clerk, J. D. Stewart.

### BIDS RECEIVED AND CONTRACTS AWARDED.

**Mo., Kansas City**—Board of fire and water comrs. opened bids for 775 tons of cast iron pipe. Four bids were received. Low bidder was American Cast Iron Pipe Co., of Kansas City, $67.60 a ton, delivery in 90 days. All bids referred to engineering dept. for recommendation.

**N. Y., Albany**—State hospital comn. opened bids for erection of addition to laundry building at Brooklyn State Hospital. Lowest bid, $40,800, was submitted by New York firm, McCann Building Co. of Albany being next with bid $47,653. W. B. Armstrong Co. of Albany entered bid $4,385 for heating work, third lowest on list. Same concern stands lowest for plumbing work with offer $6,288. Morris Kantrowitz, of Albany, was only bidder for construction work at Manhattan State Hospital. Offer was $137,800.

# TOO LATE FOR CLASSIFICATION

### STREETS AND ROADS.

**Ark., Morrillton**—Road Dist. No. 2, in Conway Co., have awarded bonds of $150,000.

**Cal., Sacramento**—1920 road building program of State Highway Comn. provides for average monthly expenditure of $1,000,000.

**Ill., Decatur**—Between 8 and 9 mi. of pavements are proposed at estimated cost of $800,000.

**Mich., Ionia**—Ionia Co. contemplates paving costing $142,860. D. C. Crawford, Hwy. Comr.

**Minn., St. Paul**—South St. Paul is contemplating continuation of Concord St. pavement to Inver Grove, and Dakota Co. plans grading of river highway to Hastings next year. Board probably will advertise for bids in Feb. Ramsey officials assured Dakota Co. Bd. that if they proceed with grading Ramsey Co. will include in its budget for 1921 "substantial aid" for converting highway into permanent road. Necessity to promote early completion of pavement on South Smith Ave., St. Paul, was discussed. It will be necessary to pave 3,000 ft. Hennepin Co. is providing funds to carry on road and bridge work. In addition to fund of $440,000 in the budget, county authorized bond issue of $286,000 in May, $125,000 in June and $400,000 worth of bridge bonds in Sept.

**Mont., Billings**—Yellowstone Co. Bids in Jan. 9, 1920, for $250,000 hard surface road bonds. Balance of $75,000 from former bond issue will make $275,000. Federal aid money for 150 mi. of roads. C. E. Durland, Co. Surv.

**Mo., Marshall**—Saline Co. will shortly vote on $1,500,000 road bonds.

**N. C., Buncombe**—$450,000 road and bridge bonds were awarded Battery Park Bank, Asheville.

**N. C., Charlotte**—$600,000 hard surface all weather road between Charlotte and Davidson to be known as Wilson Blvd., is being planned by Col. T. L. Kirkpatrick. Road will extend distance of 25 mi. Will have 5-ft. concrete base and be 25 ft. wide.

**O., Canton**—Road program for Stark Co. calls for improvement of 32 mi. of roadway. New work will cost $1,000,000. Every town in county will be inculded. Plans now being prepared by Co. Engr.

**Okla., Sapulpa**—Creek Co. voted $1,000,000 road bonds.

**Ore., Eugene**—Lane Co. in favor of bond issue of $2,000,000 for roads.

**Tenn., Dover**—Stewart Co. has voted $200,000 road bonds.

**Tex., Dallas**—Oak Cliff traffic will be facilitated by widening and opening of Davis St. to uniform width 60 ft. Total cost of this improvement $13,627. Geo. D. Fairtrace, City Engr., estimated.

**Tex., Del Rio**—Returns from Valverde Co. in election show that good roads bonds election of $400,000 carried.

**Tex., Gainesville**—Proposition has been suggested to building concrete road from here to Sherman instead of proposed interurban railway. Subject will be thoroughly investigated before final action is taken.

**Tex., Kenedy**—Sealed bids received Feb. 18, 1920, on $300,000 bond issue for road improvements in Kenedy dist., Karnes Co. J. H. Stoltzfus, Secy., Kenedy, Tex.

**W. Va., Beckley**—Raleigh Co. voted $147,000 bonds to grade and drain Clear Fork Rd.

**Wis., Hillsboro**—Jefferson Co. will spend $38,357 for road work in 1920. Grading and surfacing of ten roads is planned.

**Wis., Green Lake**—Green Lake Co. adopted road building program for 1920 costing $25,661.16. This includes building of two bridges: Ruske bridge, $914; Reimer bridge, $988. D. C. Williams, Green Lake, Wis., Comr.

**Wis., Madison**—Tentative list of roads to be constructed in 1920 has been issued by Comr. of Highways. Plans are now in preparation and work will be advertised and contracts awarded January to April. Work totals 1,805 mi. of grading, 1,530 mi. of graveling, and 192 mi. of paving.

**Wis., Medford**—Taylor Co. plan county and state aid program for 1920, which includes grading and draining 3 roads at cost $15,892.83. Ford Grahl, Medford, Wis., Comr.

**Wis., Milwaukee**—Milwaukee Co. has $380,505.48 available for 1920 county and state aid highway construction program. W. F. Cavanaugh, Pereles Bldg., Milwaukee, Wis., Comr.

**Wis., Sheboygan**—Sheboygan Co. plans road program for 1920 requiring $87,619.20 for building 17 roads. Geo. W. Ubbelohde, Sheboygan, Comr.

**Wis., Sturgeon Bay**—Door Co. appropriated $25,243.85 for surfacing 9 roads, macadam and gravel to be used. J. M. Laurie, Sturgeon Bay, Comr.

**Wis., Waupaca**—Waupaca Co. plans road building program for 1920 requiring $37,698.05 for grading and garvel surfacing 9 roads. Chas J. Knudson, Clintonville, Wis.

### BIDS RECEIVED AND CONTRACTS AWARDED.

**Tex., San Angelo**—Contracts let by Tom Green Co. Comrs. to former Representatives Charles B. Metcalfe and J. E. Ward of Dallas provide for completion of Sonora Rd., southward 26 mi. Total cost, including grading and concrete contracts let some time ago, $302,000.

### SEWERAGE.

**Ill., East Alton**—Construction of sewer system is contemplated, $125,000. J. Cruse, Pres., Bd. of Local Impvts.

**Md., Westminster**—Survey being made for sewer system. H. E. Koonty, Mayor.

**Mass., Boston**—Comr. of Public Works states that it is his intention to construct sanitary sewer 2 ft. 6 in. by 2 ft. 6 in. concrete and 2 catch basins and connections in Oswego St., city proper, at cost $12,575.

**Okla., Gadsden**—City will vote Jan. 6 on sewer bonds of $90,000.

**Wis., Campbellsport**—Election for bond issue of $15,000 for installing sewerage system, carried.

### BIDS RECEIVED AND CONTRACTS AWARDED.

**O., Canton**—Contract for construction of storm sewers in 15th St., Wise Bros., of Canton, at $5,807. Contract for motor tractor to be used in service dept. was given T. J. Tractor Co., of Cleveland, at $2,800. Rensselaer Co., of Cleveland, was given contract for valves for use in water works dept. for $5,619.

### WATER SUPPLY.

**Cal., Porterville**—South Tule Independent Ditch Co. propose construction of storage reservoir at mouth of Success Valley; cost, $70,000.

**Ga., Leslie**—Leslie will shortly vote on water and sewer bond issues. J. J. Jones, City Clerk.

**Ind., Boonville**—Efforts are being made by City Council to obtain pumping station to be owned and governed by city authorities. Petition for loan of $20,000 will be considered, which will be used for building pumping station.

**Mont., Great Falls**—W. H. Harrison, City Clerk, desires bids until Jan. 12 for purchase of bonds of $225,000, money to be used in acquiring additional water facilities.

**Mo., Webb City**—Bonds voted for water works to cost $300,000. L. O. Walker, City Clerk.

**Okla., Eufaula**—City voted $25,000 bonds to extend water works system.

**Okla., Madill**—Madill will vote Jan. 15 on $400,000 water bonds.

**S. C., Edgefield**—Plans being prepared for water system. Address J. G. Edwards, Mayor.

### BIDS RECEIVED AND CONTRACTS AWARDED.

(*Indicates Contracts Awarded.)

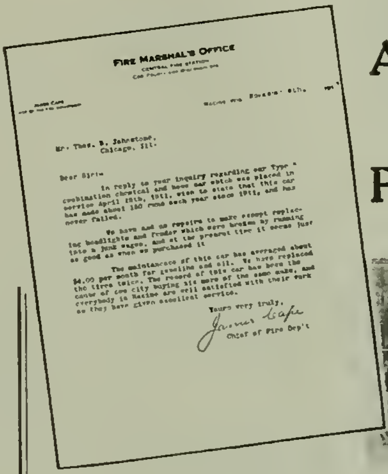
***O., Canton**—Contracts for McKinley Ave. storm sewer and Portage St. water main extension were awarded Peter Christiansen, of Canton. To Tony Marcello was awarded contract for Howard St. sanitary sewer. Dominic Nicholis, of Canton, was awarded contract for installation of sanitary sewers in Portage St., Bachtel Ave. and Cole Ave. Work will be commenced in early spring.

### LIGHTING AND POWER.

**Ind., Decatur**—Decatur has authorized $140,000 electric light power plant bonds.

**Okla., Gadsden**—City will vote Jan. 6 on bond issue of $100,000 for light plant.

**Ore., Roseburg**—In opinion of Assistant State Engr. C. E. Strickland, the North Umpqua River is the best power stream in state. Engineer Strickland has been assisting city in locating power site for proposed municipal light and water system.



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Yours very truly,
James Cape
Chief of Fire Dep't

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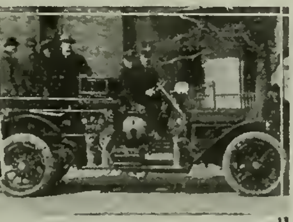

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# The Municipal Index

adviser to Dominion Cabinet. 4,000 words. Canadian Engineer, Nov. 20, Toronto, Can.

Housing and Town Planning. Address at Ottawa conference of American City Planning Institute and Town Planning Institute of Canada, by Thos. Adams, town planning adviser to Dominion Cabinet. 3 ills., 3,500 words. Canadian Engineer, Nov. 6, Toronto, Can.

The Proposed City Plan of Winnetka, Ill. Relocating tracks; establishing motor highways; districting. By E. H. Bennett, consultg. archt., Chicago. 3 ills., 1,000 words. American City, October, New York.

Paris Proves the Wisdom of City Planning. 500 words. Engineering and Contracting, Nov. 5, Chicago.

**Zones:**

Building Zones for Newark. Commission on building districts and restrictions reports complete plan for zoning with proposed ordinance; use, height and area districts; some unusual features. 2 ills., 3,200 words, Nov. 15. Regulations for area districts; rear yards; building lines; regulating existing buildings; board of appeals. 1 ill., 2,800 words, Nov. 22. Municipal Journal and Public Works, New York.

The Legality of Zoning Regulations. Court decisions hold that a city's expansion and growth are superior to whims of a few capricious landowners. By H. S. Swan, executive secy., Zoning Committee, N. Y. C. 1,700 words. American City, November, New York.

Zoning System for Chicago. Investigation and report. 4,300 words. Engineering World, Nov. 1, Chicago.

Money Value of Light and Air. Editorial comment on value of property being lowered disastrously by overshadowing buildings, in year or two after construction. 250 words. Municipal Journal and Public Works, Nov. 15, New York.

**Streets and Lots:**

Rules for the Establishment of Street Widths and Their Subdivisions. Report at American City Planning Institute and Town Planning Institute of Canada, by B. A. Haldeman, advisory engr., Zoning Commission, Philadelphia. 1,000 words. Engineering and Contracting, Nov. 5, Chicago.

Effects of Size of Lots on Cost of Industrial Housing. A study of yard frontages and depths in relation to outlays for utilities, streets and sidewalks; possible economics. By Morris Knowles, consltg. engr., Pittsburgh, Pa. 2 tables, 1,000 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

Effect of Size on Residence Lot on Cost of Street Improvements and Utilities. By Morris Knowles, consltg. engr., Pittsburgh, Pa. 1,600 words. Engineering and Contracting, Nov. 5, Chicago.

A Successful Public Market in a Small Town. By Wm. B. Hatch. 3 ills., 1,600 words. American City, November, New York.

## GOVERNMENT AND FINANCE.

Selling Good City Government. Outlining development of a definite program of constructive publicity on commission-manager government in Kalamazoo, Mich., during its first year of operation. By H. H. Freeman, city manager, Kalamazoo. 2 ills., 2,000 words. American City, October, New York.

Pittsburgh's Graded Tax Law and Its Results to Date. By Wm. McNair. 400 words. American City, November, New York.

What Cities Earn and Spend. Public service enterprises earned nearly double total of liquor taxes. 600 words. American City, November, New York.

The Municipal Bond Market. October set new record. 200 words. Municipal Journal and Public Works, Nov. 1, New York.

Teach the Average Man to Invest in Public Works Bonds. Editorial. 900 words. Engineering and Contracting, Nov. 5, Chicago.

## STRUCTURES AND MATERIALS.

**Bridges:**

Diagrams for Reactions and Bending Moments of Beams. By R. Burnham, consltg. and designing engr., Chicago. 6 diagrams, 300 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

Broader Use of Johnson's Formula for Repeated Stresses. By J. B. Kommers, ass't prof. of mechanics, University of Wisconsin, Madison. 1 chart, 4 tables, 2,000 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

Wide Bridge Built as Two Bridges Without Interval. Novel materials plant derricks designed to meet local restrictions; industrial railway distributed concrete. 5 ills., 1,200 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

Arch Bridge with Ribs Anchored by Concrete Keys. Design for concrete viaduct at Rocky Point, Ore., has 113-foot arch span; steel rib rods embedded at abutments. By C. B. McCullough, bridge engr., Oregon State Highway Comm., Salem. 1 ill., 500 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

Choose Wilmington Bridge Engineer by Competition. Five engineers asked to submit designs for new $500,000 memorial structure; each one paid $500. 1 ill., 1,000 words. Engineering News-Record, Oct. 30-Nov. 6, New York.

Niagara Railway Arch Reinforced for Heaviest Traffic. Capacity increased to meet increasing traffic demands; stresses in 550-foot arch span redistributed by changing crown shims; floor reconstructed for E70 loading; bracing and reinforcement. 4 ills., 4,000 words. Engineering News-Record, Nov. 13-20, New York.

New Type of Wood and Asphalt Flooring for Chicago Bridges. Transverse planks on edge form surface grooves, to hold asphalt surfacing; light weight and low cost. By F. H. Avery, engr. of Bridge Constr. and Repair. Dept. of Public Works, Chicago. 1 ill., 1,300 words. Engineering News-Record, Nov. 13-20, New York.

Breaking Up a Concrete Bridge, 200 words. Municipal Journal and Public Works, Nov. 1, New York.

Highway Bridges. Concrete masonry construction employed in building most bridges in Western states, following lead of railroad companies. 600 words. Municipal Journal and Public Works, Nov. 1, New York.

Bridge Engineering in Active Warfare. Civilian bridge-design methods applied in work of A. E. F. unprecedented loadings; traffic conditions; new types of bridge developed; reinforced pontoons; sectional steel bridges. Flooring, loads, impact and unit stresses. By L. E. Moore and M. W. McDonald, formerly Engrs., U. S. A. 22 ills., 4,300 words. Editorial reference to above article. 1,200 words. Engineering News-Record, Oct. 9. 22 ills., 4,700 words, Oct. 16, New York.

Bridge Approaches. Abstract of interesting discussion in August-September "Public Roads." 2 ills., 700 words. Engineering and Contracting, Nov. 5, Chicago.

What of the Public Safety in Pittsburgh? Editorial reference to turning over to architectural firms the work of designing and supervising several new bridges over the Allegheny river. 1,200 words. Engineering News-Record, Oct. 9, New York.

**Other Structures:**

Earth Slides in Winnipeg Aqueduct Construction. Description of the principal methods used by contractors in dealing with the sloughs and slides; bearing tests demonstrated instability of the soft dark clay, analysis of which showed 15% of moisture and water of combination. By D. L. McLean, formerly div. engr., Greater Winnipeg Water Dist. 7 ills., 1,200 words. Canadian Engineer, Nov. 20, Toronto, Can.

Factors in Design of Sluices and Pipe Lines for Hydraulicking. Graphical representation of formulae used in designing hydraulic pipe lines. By F. A. Goodale. 2 ills., 1,000 words. Engineering and Contracting, Nov. 19, Chicago.

Determination of Kutter's Roughness in a Drainage Ditch. Field and office work described and conclusions drawn; results indicate too low a value formerly used. By R. Bosard, with Morgan Engrg. Co., Memphis, Tenn. 5 ills., 1,300 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

New Type of Thin-Wall Cofferdam. Combined steel and timber piles form sectional design, giving low-cost, stiffness and water-tightness. 4 ills., 500 words. Engineering News-Record, Oct. 30-Nov. 6, New York.

Lowering a 400-Ton Dock Caisson Gate With Sand Jacks. Tests on manipulation of sand jacks led to their use in placing gate to Navy's Puget Sound shipbuilding dock. By G. W. Plaisted, lieut., Corps Civ. Engrs., U. S. N., Puget Sound, Wash. 8 ills., 3,400 words. Engineering News-Record, Nov. 13-20, New York.

Discharge Co-efficients for Canal Head Gates. Observations made at the Whalen head gates on the North Platte project and at the Sunnyside on the Yakima. By J. S. Longwell and J. Hinds engrs., U. S. Reclamation Service. 5 ills., 1 table, 3,000 words. Engineering World, Nov. 1, Chicago. Engineering and Contracting, Nov. 12, Chicago.

Floodgates Proposed for Control of Savannah River. Movable dam at mouth of unused channel would permit concentration of ebb to scour the main ship channel. By E. C. Garvin, Brunswick, Ga., formerly with U. S. Engr. Dept., Savannah. 1 ill., 2 tables, 2,000 words. Engineering News-Record, Nov. 13-20, New York.

Pearl Harbor Dry Dock Pump Well Large Precast Unit. Base of concrete box 96 by 45 feet in plan and 60 feet deep cast on float; upper part poured in attached cofferdam. By R. W. Gaylord, ass't engr., San Francisco Bridge Co., on Pearly Harbor Dry Dock, Honolulu, H. I. 5 ills., 2,000 words. Engineering News-Record, Nov. 13-20, New York.

Pile Foundations for Unequal Load Distribution. Design based upon analysis to insure that each pile will sustain same total safe load by proper spacing. By E. Arneson, irrigation and structural engr., Washington, D. C., 2 ills., 500 words. Engineering News-Record, Oct. 9, New York.

Making Interlocking Steel Piling Watertight. By W. T. Christine. 1 ill., 1,500 words. Engineering World, Nov. 15, Chicago.

Concrete Construction in Cold Weather. Precautions to be used and methods to be employed to insure satisfactory results; some valuable suggestions. 6 ills., 2,700 words. The Modern City, November, Baltimore, Md.

New York Vehicular Tunnel Lining. Proposed to use concrete block, as in Detroit and Montreal. By J. F. Springer. 5 ills., 3,200 words. Engineering World, Nov. 1, Chicago.

Prices of Building Materials, 1914-1919. Diagram indicating price changes in building materials during 1914-1919. Data collected and plotted by U. S. Housing Corporation. Engineering News-Record, Oct. 30-Nov. 6, New York.

Reinforced Concrete Fuel Oil Reservoirs. Paper before American Concrete Institute, by H. B. Andrews, industrial engr., Springfield, Mass. 1 ill., 2,500 words. Engineering World, Nov 1, Chicago.

**Concrete:**

Analysis of Concrete-Proportioning Theories. Data upon which Abrams' fineness modulus and Edwards' surface area methods are based show validity of water-cement ratio theory and demonstrate that fineness modulus varies with surface area; tests all agree but interpretations differ. By R. B. Young, engrg. materials laboratory, Hydro-Electric Power Comn. of Ontario. 12 charts, 3,000 words. Canadian Engineer, Nov. 27, Toronto, Can.

Effect of Rodding Concrete. Letter to editor from Duff A. Abrams, prof.-in-charge, Structural Materials Research Laboratory, Lewis Institute, pointing out error in Prof. F. E. Giesecke's tests on rodded concrete. 1,000 words. Canadian Engineer, Nov. 27, Toronto, Can.

Concrete and Its Application to Municipal Work. Stains on concrete floors; cement joints for water pipes, cracks in concrete; painting concrete surfaces. 1,000 words. Municipal Engineering and Sanitary Reord, Nov. 13, London, Eng.

Conrete Substitutes for Stone. A plea for use of natural stone. Letter from S. McPherson, Quarry Mgrs. Ass'n, Clynnog, North Wales. 500 words. Municipal Engineering and Sanitary Record, Nov. 13, London, Eng.

Experiments Show Effect of Fineness of Cement. Results of over 6,000 tests of concrete cylinders, 9,000 compression and tension tests of mortar, and several thousand miscellaneous tests; summary of paper before American Society for Testing Materials, by Duff A. Abrams, prof.-in-charge, Structural Materials Research Laboratory, Lewis Institute. Chicago. 1,300 words. Canadian Engineer, Nov. 6, Toronto, Can.

Water-Ratio as Affected by Rodding.

(*Continued on page* 42.)

# KOEHRING

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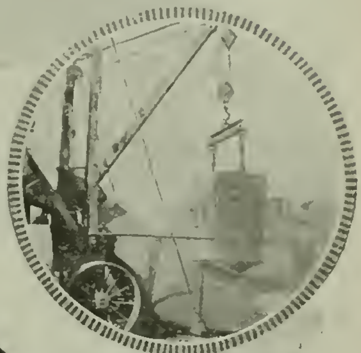

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It stands up to continuous high-speed operation—delivers the utmost season's yardage—a big extra yardage. The Koehring Paver—with the extra automatic actions of the Koehring distributing boom and bucket—is the fastest paving unit. Write for a catalog—and do it now to insure on-time delivery of your order.

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Four sizes in the Koehring line enables you to fit the mixer to your work. 10, 14, 21 and 28 cubic feet mixed concrete. Standard wet batch rating. Boom and bucket and spout distribution, steam and gasoline.

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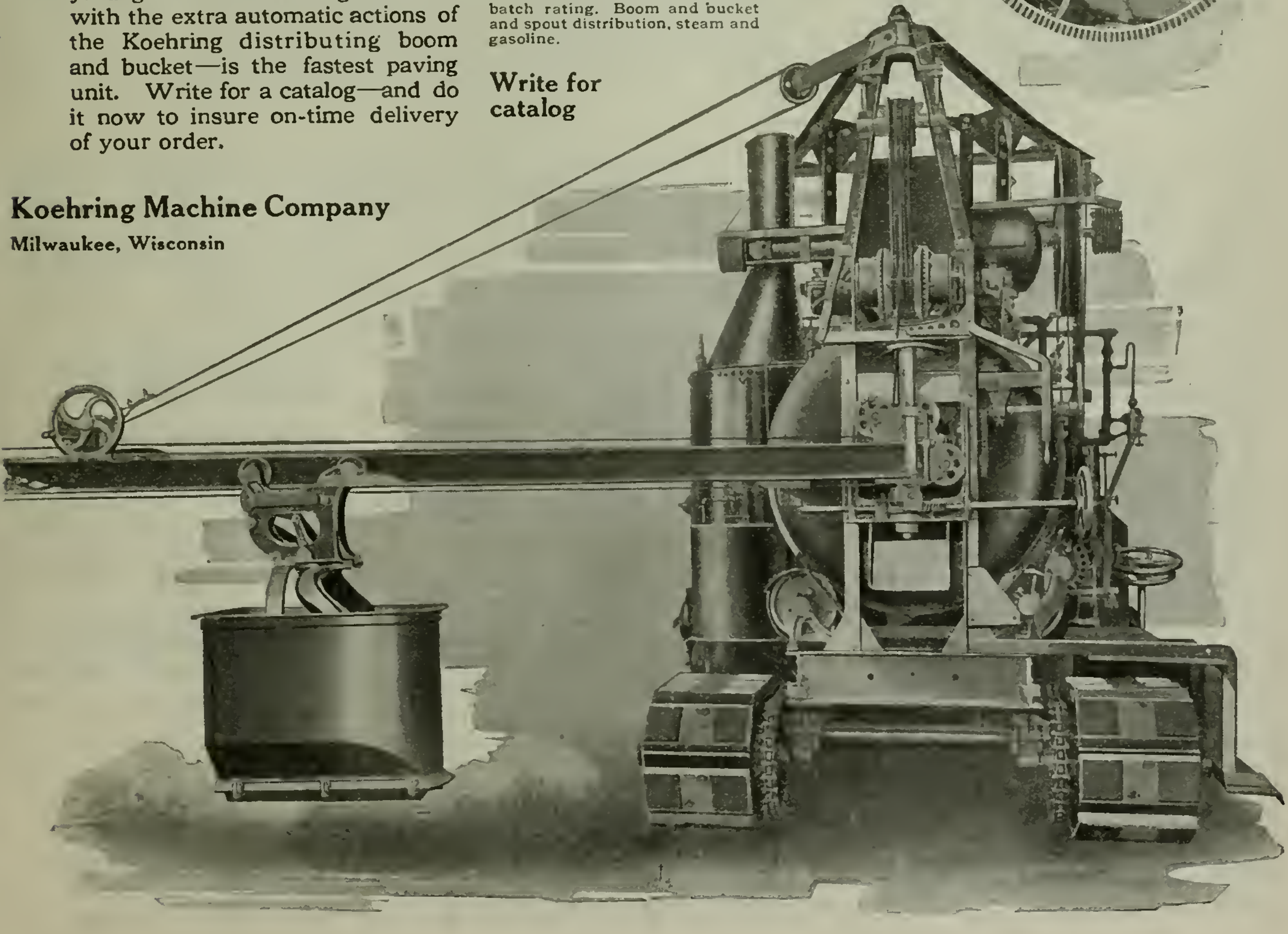

## The Municipal Index

Letter referring to Prof. F. E. Giesecke's tests on rodded concrete, from D. A. Abrams, prof.-in-charge, structural materials research laboratory, Lewis Institute, Chicago. 1,200 words. Engineering News-Record, Nov. 13-20, New York.

Burnt-Clay Aggregate and Wood Reinforced Concrete. Results of investigations in British Guiana. 400 words. Engineering News-Record, Oct. 9, New York.

### MISCELLANEOUS.

Contracts—A Comparison of "Cost Plus" With Other Forms. Use during past few years of "cost-plus" form on very large and complicated construction work seems to render time opportune for general discussion of advantages and disadvantages of this type. By E. W. Clarke, M.Am.Soc.C.E. 2,800 words. Engineering World, Nov. 15, Chicago.

Financial Statements an Aid in Procuring Contracts. From "Successful Methods," by D. J. Hauer, construction economist. 1,000 words. Canadian Engineer, Nov. 6, Toronto, Can.

H. W. Nelson's Plan of Payment for Estimating. Rules and procedure whereby each project is considered separately; fundamentals to be observed in estimating; statements by Mr. Nelson to Committee on Methods of Associated General Contractors of America. 4,800 words. Canadian Engineer, Nov. 6, Toronto, Can.

The Contractor's Salary as "Overhead." Excerpts from address before Seattle Master Builders' Ass'n, by J. F. Lidral of Arvesen & Lidral, Seattle. 1,200 words. Canadian Engineer, Nov. 20, Toronto, Can.

Demonstration Truck Tour. Trip through agricultural states made by 18 trucks and 80 men to demonstrate value for hauling and other farm work. 2 ills., 600 words. Good Roads, Nov. 5, New York.

The Motor Bus for City Service. Transportation must keep pace with the growth of the community. 2 ills., 1,300 words. American City, November, New York.

"Economic Limits of Motor Truck Weights." Letter from J. W. Pearl, Chicago, commenting on article under this title by R. C. Barnett, Kansas City, in issue of Oct. 1, and answer from the author. 1,300 words. Engineering and Contracting, Nov. 5, Chicago.

Templet Used in Clearing Sand from Irrigation Canals. Winds blow 60,000 cubic yards into ditches; draglines, plows and iron sheaves used before templet proves worth. 1,500 words. Engineering News-Record, Oct. 30-Nov. 6, New York.

Removal of Sand from Irrigation Canal by Sluicing. 1 ill., 1,300 words. Engineering and Contracting, Nov. 12, Chicago.

Land Values Raised by Drainage. Engineer cites cases where drained lands sell at $200 and $300, while former value was $10 to $20 per acre. 500 words. Engineering News-Record, Nov. 13-20, New York.

Suggestions for Reducing Waste of Irrigation Water. 2,800 words. Engineering and Contracting, Nov. 12, Chicago.

Reclamation by Drainage of Land in Mississippi Valley. By E. T. Perkins, pres., Natl. Drainage Congress, Chicago. 5 ills., 2,500 words. Municipal and County Engineering, November, Indianapolis, Ind.

Irrigation in the 14th Census of the United States. Nature and extent of works, capital, operating and cost figures, water used, drainage and water rights covered. By R. P. Teele, special agt. in charge of irrigation, Bureau of Census, Washington, D. C. 2,400 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

Engineers Resent 1916 Basis for 1919 Salaries. Made by the accounting firm of Arthur Young & Co., of Chicago, Toronto and New York. 1,400 words. Engineering and Contracting, Nov. 5, Chicago.

Changes in the Value of the Dollar. With relation to wages, salaries and prices. 1 chart, 2,600 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

Cincinnati Civic and Vocational League. An organization which teaches civics as a living social experience. By Irene D. Cornwell, director of Civic and Vocational League, Cincinnati Public Schools. 1 ill., 2,000 words. American City, November, New York.

The Community Forum and the Chamber of Commerce. Clearing house of ideas. By A. Lyle De Jarnette, pres., American Forum Ass'n. 1,300 words. American City, October, New York.

Public Abattoirs. Of 1,400 municipalities investigated by American Public Health Association, only 195 had meat inspection of any kind. 400 words. Municipal Journal and Public Works, Nov. 1, New York.

Wire Ropes in Contract Work. Suggestions for prolonging their life and avoiding accidents; making socket and clamp joints. 1,700 words. Municipal Journal and Public Works, Nov. 8, New York.

American Society for Municipal Improvement Convention. Narrative of the doings of the society at New Orleans convention; reports of secretary, treasurer and committees; papers and discussions; exhibits; no changes in specifications. 2,000 words. Municipal Journal and Public Works, Nov. 8, New York.

Wind as Motive Power. Notes on windmills for pumping sewage and water. Factors governing size of wind engines; wind engine gearing. 2,700 words. Municipal Engineering and Sanitary Record, Nov. 20, London, England.

Relative Sanitary Values of Different Types of Drinking Fountains. Results of tests of vertical-nozzle types. By L. V. Dieter, bacteriologist, Health Dept., D. C., 4 ills., 2,000 words. American City, November, New York.

Engineering and Construction Prospects in Roumania. Much work needed on railroads; several large bridges to be rebuilt; paved streets needed; harbor extensions desirable. By R. S. Doman, Amer. Red Cross. 1,600 words. Engineering News-Record, Nov. 27-Dec. 4, New York.

Increasing Municipal Revenue by Developing Harbor and Inland Waterway Facilities. By C. W. Stanford, consltg. harbor engr., Mann & MacNeille, N. Y. C. 2 ills., 1,100 words. American City, November, New York.

Tidal Storm at Corpus Christi and Its Effect on Engineering Structures. High water sweeps over barrier islands, relied upon for protection; buildings demolished; serious damage done to concrete causeway. By T. Bartlett, Bartlett & Ranney, engrs., San Antonio, Texas. 7 ills., 4,000 words. Engineering News-Record, Nov. 13-20, New York.

Development of Favorable Public Opinion Toward Utilities. Policy of decrying publicity and information has changed to one of taking public into confidence; employes and stockholders can help. Paper before Illinois State Electric Ass'n, by J. F. Gilchrist, vice-pres., Commonwealth Edison Co., Chicago. 1 ills., 3,700 words. Electrical Review, Nov. 1, Chicago.

Railway Bridge Painting Practice. 600 words. Engineering News-Record, Oct. 30-Nov. 6, New York.

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Pennsylvania State Highway Department, Harrisburg, Pa.—Sealed proposals will be received on or before January 19, 1920, for the furnishing, delivering and installing at Harrisburg, Pa., of dumping equipment with hydraulic and hand hoist, on Peerless, Heavy Aviation, Nash, Pierce and Packard chassis. Bidding blanks and specifications will be furnished free, as well as all necessary information, upon application to State Highway Department, Harrisburg, Pa. LEWIS S. SADLER, State Highway Commissioner.

### Proposals for Fire Hose

Sealed proposals for 1,500 feet fire hose will be received by the Commissioners of the Town of Phillipsburg, N. J., on or before Wednesday, January 21, 1920, at 2:00 P. M. The Commissioners reserve the right to reject any or all bids. Samples and prices to be submitted to

**JOHN H. HOUSER, Director Public Safety**
Phillipsburg, N. J.

Pennsylvania State Highway Department, Harrisburg, Pa.—Sealed proposals will be received at the State Capitol until 10:00 A. M., January 27, 1920, when bids will be publicly opened and scheduled, and contracts awarded as soon thereafter as possible, for the reconstruction of the following pavements: 10,610 linear feet of Reinforced Concrete in Armstrong County; 3,055 feet of Vitrified Brick in Beaver County; 46,966 feet of Reinforced Concrete in Butler County; 24,207 feet of Reinforced Concrete in Cambria County; 23,420 feet of Reinforced Concrete in Carbon County; 13,027 feet of Reinforced Concrete and Hillside Vitrified Brick, also 7,291 feet of Reinforced Concrete in Clearfield County; 18,514 feet of Reinforced Concrete, also 18,619 feet of either One Course Reinforced Concrete and Hillside Vitrified Brick or Two Course Reinforced Concrete and Hillside Vitrified Brick in Crawford County; 41,753 feet of either Bituminous Surface Course on a Concrete Foundation or Reinforced Concrete in Dauphin and Perry Counties; 5,467 feet of Reinforced Concrete, also 14,496 feet of Reinforced Concrete and Hillside Vitrified Brick in Fayette County; 23,201 feet of Reinforced Concrete in Greene County; 14,800 feet of Reinforced Concrete in McKean County; 20,164 feet of Reinforced Concrete in Northampton County; 12,925 feet of either Bituminous Surface Course on a Concrete Foundation or Reinforced Concrete in Potter County; 39,500 feet of Reinforced Concrete and Hillside Vitrified Brick in Schuylkill County; 3,419 feet of Reinforced Concrete in Venango County; 22,287 feet of Reinforced Concrete and Hillside Vitrified Brick; also 54,577 feet of Reinforced Concrete in Warren County; 79,664 feet of Reinforced Concrete and Hillside Vitrified Brick in Westmoreland County. Bidding blanks and specifications may be obtained free, and plans upon payment of $2.50 per set, upon application to State Highway Department, Harrisburg, Pa. No refund for plans returned. They can also be seen at office of State Highway Department, Harrisburg; 1001 Chestnut Street, Philadelphia, and 904 Hartje Building, Pittsburgh, Pa. LEWIS S. SADLER, State Highway Commissioner.

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